THE REVIEW

OF

APPLIED MYCOLOGY

Vol. XI

ISSUED BY THE IMPERIAL
MYCOLOGICAL INSTITUTE

THE IMPERIAL MYCOLOGICAL INSTITUTE
KEW, SURREY

1932

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PRINTED IN GREAT BRITAIN

ERRATA

Page	10	line 31	for '*Frichlinger*'	read '*Fricklinger*'
	24	28 and 37	for '*ribes-caricis*'	„ '*ribesii-caricis*'
	25	32	„ '6'	„ '61'
	75	19	„ 'Abbott (E. P.)'	„ 'Abbott (E. V.)'
	105	50	„ 'x, p. 525'	„ 'ix, p. 561'
	138	10	„ '*carolensis*'	„ '*carolinensis*'
	158	10	„ '*ultissima*'	„ '*altissima*'
	172	13	„ '16 to 5'	„ '16 by 5'
	226	9	„ '*pitteriana*'	„ '*pittieriana*'
	244	34	„ 'Fisher (R.)'	„ 'Fischer (R.)'
	258	43	„ 'Leach (J. C.)'	„ 'Leach (J. G.)'
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	299	15	„ '*Gibbellula*'	„ '*Gibellula*'
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	346	1	„ 'Cook (M. T.)'	„ 'Cook (H. T.)'
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	559	39	„ '1928'	„ '1929'
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	593	34 and 41	for '*cochliodes*'	„ '*cochlioides*'
	640	8	„ 'Bach (W. T.)'	„ 'Bach (W. J.)'
	646	32	„ 'ibid., xi, p. 373'	„ 'loc. cit.'
	662	47	„ 'and *H. papayae*'	„ 'with a two-celled conidial form'
		48	„ 'but'	„ 'and'
	683	27	„ 'Lewis (R. O.)'	„ 'Lewis (R. D.)'
	685	42	„ 'Popham (F. T.)'	„ 'Popham (F. J.)'
	727	1	delete [*Mycosphaerella*]	
	750	2	for '334'	„ '333'
	758	48	„ 'Mulligan (B. A.)'	„ 'Mulligan (B. O.)'
	789	11	„ 'Reinecke (O. S. A.)'	„ 'Reinecke (O. S. H.)'
	808	5	„ 'acropetal necrosis'	„ 'acronecrosis'

IMPERIAL MYCOLOGICAL INSTITUTE

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VOL. XI JANUARY 1932

ENDÔ (S.). **Comparative studies on the morphology and physiology of Japanese and Philippine Hypochnus as well as Hypochnus solani.**—*Agric. Studies*, xiv, 3 pp., 1930. (Japanese.) [Abs. in *Japanese Journ. of Botany*, v, 4, p. (89), 1931.]

Further comparative studies on the morphology, temperature relations, and effect on the host [rice] of *Hypochnus* [*Corticium*] *sasakii* [*R.A.M.*, x, p. 815] and the Philippine fungus placed by Palo in the *Rhizoctonia* [*C.*] *solani* group confirmed the evidence previously obtained by the writer as to the identity of these two organisms [ibid., vii, p. 266]. *C. solani*, of widespread occurrence in Europe and America, was found to differ from *C. sasakii* in various respects.

NAGAI (I.) & IMAMURA (A.). **Morphology of the 'neck' of the panicle as related to the resistance against blast disease in Rice varieties.**—*Ann. Agric. Exper. Stat. Gov.-Gen. Chosen*, v, pp. 289–304, 3 pl., 1931. (Japanese.) [Abs. in *Japanese Journ. of Botany*, v, 4, pp. (101)-(102), 1931.]

The examination of the anatomical structure of the neck of the panicle in 76 rice varieties disclosed extensive differences in the number of stomata in this region. The greater the number of stomata in the neck, the lower was the degree of resistance to blast [*Piricularia oryzae*: *R.A.M.*, ix, p. 556; x, p. 337]. It was further shown, however, that foreign rice varieties, notwithstanding their larger number of stomata, are more resistant to blast than Japanese ones, indicating that some other factor may be involved in reaction to the disease. The number of stomata was found to be increased by abundant manuring.

MURRAY (R. K. S.). **Diseases of Rubber in Ceylon.**—Booklet issued by Rubber Res. Scheme, Ceylon, 38 + vi pp., [? 1931].

This booklet, primarily intended to be a manual for planters, gives notes on the symptoms and control of the chief diseases (arranged by the parts of the tree attacked) of *Hevea* rubber in Ceylon. The diseases and pests of cover crops are briefly dealt with in a separate

section, and an appendix contains recommendations for the preparation and application of certain fungicides and disinfectants. Most of the information contained in this publication has already been noticed from time to time in this *Review*.

SANDERSON (A. R.). **Annual Report 1930. Pathological Division.** —*Ann. Rept. Rubber Res. Inst. Malaya, 1930*, pp. 82–88, 1931.

In this report, which is on similar lines to that for the previous year [*R.A.M.*, ix, p. 739], brief popular notes are given on the diseases of rubber prevalent in Malaya during 1930, the chief investigations conducted during the same period being listed.

The two most important root diseases in Malaya remain *Fomes lignosus* and *F. pseudoferreus* [loc. cit.]; there is little doubt that the latter tends increasingly to become the limiting factor in old rubber areas, and largely on account of this fungus and the reduction in stand and decrease in crops brought about through its agency, replanting programmes for old rubber areas will, in many cases, have to be reconsidered before long. Investigations still in progress demonstrated clearly that *F. pseudoferreus* may be present in a very active state in six-year-old rubber; unless control is established promptly, the fungus becomes increasingly harmful.

Attacks by *Helminthosporium heveae* [ibid., ix, p. 127] were frequently very severe in nurseries, and occasionally in young clearings less than eighteen months old. A long drought was a very important contributory factor to the severity of this disease.

STANER (P.). **Quelques maladies de l'Hévéa.** [Some diseases of *Hevea*.]—*Bull. Agric. Congo Belge*, xxi, 3, pp. 649–658, 8 figs., 2 diags., 1930. [Received September, 1931.]

Brief notes are given in popular terms on the identification (by means of a short analytical key of the symptoms) and control of the following root diseases of *Hevea* rubber in the Belgian Congo, viz., *Fomes lignosus*, *F. lamaoensis*, *Ustulina zonata*, *F. pseudoferreus* [see preceding abstract], and *Sphaerostilbe repens*, as well as of the abnormal physiological condition that results from excessive soil moisture. There is a short account of a case of polyphagous parasitism by *F. lignosus*, in which the fungus had extended from a rotting *Ficus* stump to *Hevea*, *Leucaena glauca*, and cacao trees, all in the same line of extension. The roots of the affected cacao trees were only attacked on the one side, and the trees were not killed, though they were bent over at the collar. The paper concludes with a description of a disease noted on the trunk of a 25-year-old, untapped *Hevea* rubber tree, which showed the presence of a diseased area of the bark extending to a height of 60 cm. from the ground. The bark, phloem, and cambium were necrosed and the surface of the lesion was covered with plaques of a zonate, pearly-white, white-edged species of *Corticium*, the spores of which measured 8 by 3 μ. As the old sporophores dried up new ones progressively appeared.

NORMAN (A. G.). **The biological decomposition of plant materials. Part IV. The biochemical activities on straws of some cellulose-decomposing fungi.**—*Ann. of Appl. Biol.*, xviii, 2, pp. 244-259, 2 graphs, 1931.

The purpose of the investigation described in detail in this paper was to determine the biochemical activity of soil fungi in the decomposition of plant residue, as tested by their individual action in pure culture on oat straw in contrast to decompositions effected by a mixed microflora at various temperatures [cf. *R.A.M.*, x, pp. 550–552]. The results of experiments in which the following organisms isolated from rotting straw were used, *Trichoderma* sp., *Phoma* sp., *Aspergillus flavipes*, *A. fumigatus*, *A. nidulans*, *A. niger*, *A. terreus*, *A. versicolor*, and *Actinomyces* sp., indicated that all these fungi decompose cellulose to a considerable extent, though none of them develops appreciably on cellulose-agar plates. Certain minor differences in ability to utilize the carbohydrate constituents were observed, but in general all substances, with the exception of the lignin, were attacked to a degree relatively proportional to the apparent total loss of organic matter. No correlation was detected between the 'nitrogen factor' (i.e., the amount of nitrogen immobilized by 100 gm. straw rotting with a particular organism) and the loss of organic matter or of any particular constituent of the straw, the differences in this factor appearing to be inherent varietal characteristics of the species employed. Some indication of the relative efficiency of the various organisms was obtained from a factor representing the amount of nitrogen immobilized as microbial protein in the course of the removal of 100 gm. organic matter from any given plant material; it is pointed out, however, that this factor, for which the name 'nitrogen equivalent' is suggested, it not of absolute value, but only approximate, and varies from material to material according to the availability of the carbohydrate constituents to the microflora involved in the process of decomposition.

WAKSMAN (S. A.) & MCGRATH (J. M.). **Preliminary study of chemical processes involved in the decomposition of manure by Agaricus campestris.**—*Amer. Journ. of Botany*, xviii, 7, pp. 573–581, 1931.

An account is given of investigations carried out at the New Jersey Agricultural Experiment Station to elucidate the chemical changes occurring in the process of composting horse manure preparatory to inoculation with the edible mushroom, *Psalliota campestris*, as well as those taking place during the actual growth of the mushroom from the spawn inoculated into the composted manure.

The four chief constituents of the organic matter of the manure are the cellulose, the hemicelluloses, the lignin, and the protein. The hemicelluloses were found to undergo the most rapid decomposition during the early stages of composting before the introduction of the spawn, and there was relatively less decrease in them while the mycelium was growing, indicating that this group of substances does not form a very important nutrient for the

growth of *P. campestris*. In the case of cellulose, however, the relative concentration only began to decline after the introduction of the spawn, suggesting that this constituent may play a part in the nutrition of the mushroom. Furthermore, during the period of active mushroom growth there was a rapid reduction in the lignin and protein contents, whence it may be inferred that both these groups are utilized by the fungus.

MARTIN (J. P.). **Pathology.**—*Proc. Hawaiian Sugar Planters' Assoc., Fiftieth Ann. Meeting, 1930*, pp. 437–451, 1931.

Field observations and laboratory tests have shown that the P.O.J. 2878 sugar-cane variety is much more resistant to eye spot [*Helminthosporium ocellum*: *R.A.M.*, ix, p. 681] than H. 109. Young plants of the latter variety were grown at the pathology plot in solutions containing different ratios of calcium : magnesium, calcium : potassium, and calcium : sodium. The number of eye spot lesions resulting from inoculation with the spores of *H. ocellum* was reduced when the magnesium, potassium, or sodium were in greater amounts than the calcium. Comparative inoculation experiments with *H. ocellum* and the brown stripe fungus [*H. stenospilum*: ibid., viii, p. 134] showed that the former produces lesions within a few days, while the latter requires a much longer period. C. W. Carpenter has obtained the ascospore stage of the brown stripe fungus, which proved to be a species of *Ophiobolus*. Inoculations with single spore cultures from the cultures containing the perfect stage were successful and the fungus was reisolated from the resulting lesions.

C. W. Carpenter states that practically all cane land in the 'growth failure areas' is now occupied by varieties resistant to the form of root rot caused by *Pythium aphanidermatum* [ibid., ix, p. 681]. In pot tests the P.O.J. 2878 has shown a degree of resistance to this disease comparable to that of H. 109.

The symptoms of pokkah boeng [loc. cit.] were readily induced in rapidly growing cane by injecting the spindle with spores from pure cultures of a fungus of the *Fusarium moniliforme* [*Gibberella moniliformis*] type which has been tentatively identified as *F. moniliforme* var. *subglutinans*.

Definite red stripes were observed on P.O.J. 2878 in Kawela Field, Molokai, and several bacteria were isolated from the diseased material. With one of these, lesions similar to those occurring in nature were reproduced by artificial inoculation. The organism was found to differ widely in cultural characters from the causal organism of red stripe (*Phytomonas rubrilineans*) [ibid., ix, p. 406].

Attention was first drawn to a chlorotic leaf streak, now known as chlorotic streak disease, in October 1929. The cause has not been established by laboratory studies, but field observations have shown that infection is readily transmitted by cane cuttings, thus showing that it is systemic. Chlorotic streaks with irregular or wavy outlines are conspicuous on the older leaves, the lesions on the young foliage being somewhat indefinite. The symptoms of chlorotic streak are similar to those of the 'fourth disease' in Java [ibid., ix, p. 271], the cause of which is stated to be unknown.

AGATI (J. A.). **Studies on the root-rot of the Sugar-Cane seedlings in the nursery.**—*Philipp. Journ. Agric.*, ii, 1, pp. 1–26, 5 pl., 1931.

Sugar-cane seedlings in the Philippine Islands are seriously affected by a root disease caused by a species of *Pythium* first observed in October, 1929, on hybrid seedlings [*R.A.M.*, x, p. 96], viz. Co. 205 × Hind's Special, Hind's Special × H. 109, H. 109 × P.O.J. 2878. D. 152 × P.B. 118, and P.O.J. 2878 × D. 152. The fungus attacks the Negros Purple, H. 109, and Badila varieties in the field. The tissues at and near the tips and other tender parts of the young roots are invaded. The diseased tips become watery and flaccid, while the whole root system is abnormally branched and stubby and may show brown lesions. Infected plants are generally stunted, with chlorotic, wilted leaves. Small infected seedlings die out suddenly. After the pricking stage, at which infection is liable to occur, the tendency to root rot is greatly reduced and many of the transplants may survive if immediately transferred to uninfested soil. In the field the root rot is commonly observed on six-month-old ratoons.

The causal organism is readily isolated from the cane roots, and produces in culture an abundant white aerial mycelium; numerous terminal oogonia ranging from 24 to 35 μ in diameter; terminal, subterminal, or intercalary, barrel-shaped antheridia, sometimes furnished with a crooked or protuberant neck, and making narrow contact with the oogonium to which two or more may be applied; spherical oospores 20·4 to 31 μ (average about 25 μ) in diameter; and (in water) irregular, oval or globular, swollen presporangia liberating zoospores freely under favourable conditions. The optimum temperature for development appears to lie between 20° and 30°, with a minimum and maximum at 15° and 35°, respectively. In inoculation experiments on maize seedlings *Pythium* infection increased in proportion as the temperature sank from 30° to 15°. The fungus was found to develop over a hydrogen-ion range of P_H 5·3 to 9·6, the optimum lying between P_H 7·0 and 8·3. It is closely related to *P. aphanidermatum* [see preceding abstract] but its exact identity has not yet been determined.

Promising results have been given by experiments in the control of root rot by soil sterilization (baking for 2 to 3 hours at 100° C. or above, or scalding with boiling water) and disinfection with formalin (1 in 50) or sulphuric acid (7 c.c. per 500 c.c. water).

The effect of soaking seed-pieces upon germination.—*Sugar News*, xii, 7, pp. 436–440, 1 diag., 1931.

In an experiment planned by H. A. Lee and conducted with the co-operation of M. Medalla, B. Desembrana, and D. Gonzaga, it was found that the bacterial and fungal deterioration of sugar-cane seed pieces, which is liable to cause a heavy reduction of germination in the Philippines, is largely preventable by soaking the seed pieces for 12 hours in clear, running water. This process increased germination by nearly 15 per cent. in comparison with the untreated controls, while the number of stalks per hect. was augmented by over 33 per cent. Soaking for 24 hours proved less

satisfactory and 48 hours' immersion led to a reduction of germination as compared with the controls.

CURZI (M.). **Rapporti fra i generi Microascus Zukal e Scopulariopsis Bainier.** [The relations between the genera *Microascus* Zukal and *Scopulariopsis* Bainier.]—*Boll. R. Staz. Pat. Veg.*, N.S., xi, 1, pp. 55–60, 1931.

From his studies of the perithecial stage of various species of *Scopulariopsis* Bainier [*R.A.M.*, ix, p. 410] the author concludes that Biourge's subsection *anomala* of the genus *Penicillium* [ibid., iii, p. 178] should be transferred to the former genus. There is a far wider divergence between *Penicillium* and *Scopulariopsis* than there is between the former and *Aspergillus*, since the ostiolate perithecia of *Scopulariopsis* assign the genus to the Sphaeriales, while the other two are Plectascales.

The author considers that it is not possible to maintain *Scopulariopsis* distinct from *Microascus* Zukal, in spite of the fact that the former is typically Mucedineous and the latter Dematiaceous. Some of the species of *Stysanus*, with phialid-shaped conidiophores, are also considered to be congeneric.

Those species of *Scopulariopsis* and *Stysanus* which have dark hyphae and conidia have conspicuously rostrate perithecia, while those with hyaline hyphae and conidia have non-rostrate perithecia. In both groups, however, the perithecia agree in all other respects, particularly in the formation and arrangement of the asci and the (normally abundant) ascogenous fructification.

The genera *Peristomium* Lech. and *Nephrospora* Loub. should also be regarded as synonyms of *Microascus*. The conidial stage of *Peristomium desmosporum* var. *verticillium* Lech. is of the *Scopulariopsis* type, and bears no relation to *Verticillium*.

Amongst other fungi that should be referred to *Microascus* are *Acaulium albo-nigrescens* Sopp, *A. nigrum* Sopp, *Rosellinia schumacherii* (Hans.) Sacc., and *Melanospora stysanospora* Matt.

Forty-third Annual Report of the Kentucky Agricultural Experiment Station for the year 1930.—48 pp., 1931.

In the section of this report dealing with tobacco diseases (pp. 22–24) [cf. *R.A.M.*, x, p. 85] it is stated that a white and a green cucumber mosaic, both of which produced ring-like green patterns, different from those already reported, on tobacco, are being investigated. Two strains of the white cucumber mosaic after being passed through cucumbers each produced a form of streak on tomatoes characterized by light brown necrotic areas.

White Creaseback, Striped Creaseback, and Cut Short beans [*Phaseolus vulgaris*] were inoculated with the various virus diseases of tobacco under study in Kentucky [cf. ibid., x, p. 60]. All the diseases grouped with true tobacco mosaic produced small necrotic lesions on the leaves. Of the viruses that produced disease, only ring spot [ibid., x, p. 86] gave large necrotic areas or ring-like necrotic and chlorotic patterns. Usually the new growth was killed. From these results it appears that beans may be used as a further means of identifying viruses of the true tobacco mosaic group.

A virus transferred from plantain (*Plantago major*) to tobacco produced symptoms different from those of the other tobacco virus diseases investigated. What appears to be the same virus was also obtained on at least three occasions from naturally infected tobacco.

In an attempt to obtain the veinbanding virus [loc. cit.] some 400 inoculations were made from native perennial weeds to tobacco: three of the inoculated plants were found to contain a mixture of tobacco mosaic and veinbanding, indicating that the local vegetation may harbour the latter virus.

A virus transferred by budding from Japanese plum [*Prunus japonica*] to peach produced prominent chlorotic line and ring patterns similar to those seen in tobacco ring spot; occasionally, patterns were found in the leaves of affected plum trees.

Frenching of Turkish tobacco [loc. cit.] grown in soil in the greenhouse was again found to be related to nutrient deficiency and lime supply. Frenching was not found in plants grown in soil of a P_H value of below about 6, irrespective of nutrient deficiencies. When the plants, however, were grown in soil having a P_H value of over 6, frenching was not noted except in the presence of certain nutrient deficiencies. In the latter soils it appeared to occur when there was a deficiency of nitrogen, phosphorus, or potassium.

As the selections hitherto made for resistance to black root rot (*Thielaviopsis basicola*) [ibid., viii, p. 613; x, p. 135] were not very resistant, hybridization was resorted to in an attempt to obtain more highly resistant varieties of White Burley tobacco. A variety designated No. 5 was found much more resistant in diseased plots than the widely grown 36–12 selection of Burley.

Cook (M. T.). **The leaf spot of Tobacco; an after symptom of mosaic.**—*Journ. Dept. Agric. Porto Rico*, xv, 2, pp. 183–187, 1931.

During the winter of 1929–30 the writer investigated a leaf spot of tobacco which he had first observed in Porto Rico in 1923. The spots always occurred on mature leaves, usually the lower ones; they were 2 to 5 mm. in diameter, white, brown, or black, and composed of dry, dead tissues. Careful examination of the lesions showed that they were always on the old leaves of mosaic plants, on which the symptoms either failed to develop on account of late inoculation or from which the pattern had disappeared. Plants showing no spots were observed from day to day and were found to develop spots in large numbers during the night. Following the inoculation with mosaic of plants in one part of a divided block spots appeared on the old leaves.

Cytological examination of the diseased material showed that the spots originated in the palisade cells. Many consisted of a single cell, and were invisible to the naked eye, while others ranged from small groups of a few cells to areas of 5 mm. or more in diameter. The death of the palisade cells is followed by that of those underlying them, this process usually continuing until all the cells from the upper to the lower surface are dead. Occasionally dead mesophyll cells are found in positions unrelated to the

spots. The entire cell content appears to disintegrate into a homogeneous black mass which dries and shrinks from the cell wall. The successive steps in this process are the collapse of the upper epidermis, the breaking of the cell walls throughout the affected area, contraction, and desiccation.

Attention is drawn to the similarity of these symptoms with those described by Mayer (*Landw. Versuchsstat.*, xxxii, p. 450, 1894) and others as occurring in the later stages of tobacco mosaic, some citations from the relevant literature being given.

Cook (M. T.). **Some undescribed symptoms of mosaic in Porto Rican Tobacco.**—*Journ. Dept. Agric. Porto Rico*, xv, 2, pp. 189–191, 1931.

The tobacco mosaic of Porto Rico [see preceding abstract] may be described as the common type characterized by irregular green and white areas, sometimes accompanied by inconspicuous blistering or pocketing. In very severe cases the entire plant may be pale yellow or nearly white, with small, rather brittle leaves and turned down margins. The virus responsible for tobacco mosaic is also able to produce a mosaic of tomato and pepper [*Capsicum annuum*: *R.A.M.*, x, p. 809], and when transferred back to tobacco the symptoms are the same as those on the original plant. The virus is also transmissible between tomato and pepper, the symptoms on the former being a slight reduction in the size of the leaves, mottling, and the dwarfing of some of the basal leaflets to short spurs, hardly more than a midrib.

Inoculation experiments by means of a hypodermic needle inserted at the node generally resulted in the development of mosaic symptoms in five to ten days. The typical symptoms developed on the new foliage at the top of the plant and on new shoots at any point, but were rarely observed on old leaves. On leaves that were not quite full-sized at the time of inoculation, but in which the tissues were fully differentiated, more or less circular, pale areas sometimes developed, due to the inhibition of the chloroplasts. Leaves ranging from one to two inches in length were readily inoculated by rubbing with cheese-cloth soaked in juice from a mosaic plant. In five to ten days pale spots 10 to 12 mm. in diameter appeared.

A histological study of the leaves of different ages showed (1) that when the tissues were not fully differentiated at the time of inoculation, there was an inhibition of the development of both cell structure and chloroplasts; (2) that when chlorotic areas were formed on leaves with fully developed tissues there was no change in cell structure, but the growth of the chloroplasts was inhibited; and (3) that the enlargement of the mosaic areas on young leaves is due to cell division and growth and not to an invasion of the surrounding cells by the virus.

Pittman (H. A.). **'Downy mildew' (so-called 'blue-mould') of Tobacco. The industry's most serious menace, and how to combat it.**—*Journ. Dept. Agric. Western Australia*, 2nd Ser., viii, 2, pp. 264–272, 3 figs., 1931.

In this paper the author points out the seriousness in Australia

of downy mildew or blue mould (*Peronospora* sp.) of tobacco [*R.A.M.*, x, p. 492]; in Western Australia, however, the disease is, in most instances, very largely a seed-bed disease, although at times it may cause very severe losses, as for instance in 1930 [ibid., x, p. 134], after the seedlings have been planted out in the fields. After a brief description of the symptoms of the disease and of the life-history of the fungus, the paper deals mainly with control measures, most of which have already been noticed [loc. cit.].

JEHLE (R. A.). **Tobacco seedbed survey in Maryland.**—*Plant Disease Reporter*, xv, 8, pp. 85–86, 1931. [Mimeographed.]

Downy mildew of tobacco (*Peronospora hyoscyami*) was found for the first time in Maryland during the summer of 1931 [*R.A.M.*, x, p. 629], twelve seed-beds being affected. Severe injury was reported in only one case, the plants apparently having suffered even after transplanting to the field. Climatic conditions in the State are generally favourable to the development of downy mildew, and the adoption of a regular spraying or dusting schedule will probably be necessary to keep it in check.

THOMAS (R. P.). **The relation of nitrate nitrogen and nitrification to the growth of Tobacco following Timothy.**—*Wisconsin Agric. Exper. Stat. Res. Bull.* 105, 28 pp., 7 figs., 1930.

The primary object of the present investigation was to examine the problem of brown root rot of tobacco [*R.A.M.*, x, p. 763] from the standpoint of soil technology.

Very low amounts of nitrate nitrogen were found during the early part of the season in all Wisconsin soils on which tobacco was subject to brown root rot (timothy [*Phleum pratense*] sod soils). In many cases abundant nitrates were found later in the season On the other hand, plentiful amounts of nitrate nitrogen were found early in the season in soils on which tobacco grew well and was free from the disease. This shows the importance of an ample supply of nitrate nitrogen in the soil at the time when the tobacco is transplanted; once brown root rot develops the addition of nitrate nitrogen is of little value.

It was invariably found that soils producing tobacco affected by brown root rot contained a large amount of cellulose material. It was also shown that applications of cellulose, e.g., filter paper, at the rate of 2 tons per acre, to good tobacco soils resulted in a low nitrate content and poor growth combined with brown root rot. This effect could be overcome by heavy applications of easily nitrifiable materials and (where available phosphorus was deficient) of superphosphate.

The addition of lime to low and medium amounts of nitrogen and phosphorus in the poor tobacco soils produced only slight increases in the growth of tobacco in greenhouse tests, and had little or no effect on the incidence of brown root rot.

It is evident from these studies that plenty of available plant food, especially nitrogen and phosphorus, should be added to soils on which brown root rot of tobacco is prevalent. A soil to which large amounts of cellulose materials, e.g., straw and sawdust

manures and timothy sod, have been turned under, should not be put into tobacco without heavy applications of nitrate or an easily nitrifiable nitrogen and phosphate fertilizer.

There is some evidence that brown root rot of tobacco may be caused by the actual invasion of the roots by certain fungi. Possibly an abundance of energizing matter in the form of cellulose may stimulate fungous growth to such an extent that a shortage of nitrogen is created, with the result that the organisms attack the weakened roots in their search for nutriment.

HEUBERGER (J. W.) & MOYER (A. J.). **Influence of mosaic infection on Tomato yields.**—*Phytopath.*, xxi, 7, pp. 745–749, 1931.

Details are given of investigations conducted at the Maryland Agricultural Experiment Station in 1927 and 1930 to determine the effect of mosaic on the yield of Greater Baltimore and Marglobe tomatoes (the latter in 1930 only) [cf. *R.A.M.*, vii, p. 619]. In the 1927 test observations were made on the influence on the yield of the time of appearance of the symptoms in naturally infected plants, while in 1930 the plants were inoculated on four successive dates by the needle-prick method [ibid., viii, p. 138].

In both cases early infections were found to cause the heaviest reduction in yield. In 1927 the loss due to mosaic in plants showing the first symptoms on 8th July was 56·9 per cent. compared with 1·9 per cent. for those in which the disease appeared on 5th August. In 1930 the loss for plants inoculated on 26th June was 54·4 per cent., the corresponding figure for those inoculated on 3rd September being 11·2 per cent. The greater loss from late infections in the latter season is tentatively attributed to the retarded growth of the plants consequent on abnormally dry conditions.

FRICHLINGER (H. W.). **Die Streifenkrankheit der Tomaten, ein neuartiges Krankheitsbild.** [Stripe disease of Tomatoes, a new pathological picture.]—*Erfurter Führer im Obst- und Gartenbau*, xxxi, p. 395, 1930. [Abs. in *Zentralbl. für Bakt.*, Ab. 2, lxxxiv, 8–14, p. 328, 1931.]

Tomatoes in the Crefeld [Rhine] district of Germany have been affected for the last two years by a disease in which light to dark brown streaks, 1 to 15 cm. in length, develop on the stems, and dark brown spots appear on the leaves and fruits. The foliage is also crinkled with a tendency to shrivelling and desiccation. The causal organism of the disease, which was evidently introduced from Holland, is *Bacillus lathyri* [*R.A.M.*, x, p. 212]. Rapidly growing varieties appear to be more liable to streak disease than those maturing slowly, while infection is further favoured by liberal applications of nitrogen and by potash shortage.

HUMPHREY (C. J.) & LEUS (SIMEONA). **A partial revision of the Ganoderma applanatum group, with particular reference to its oriental variants.**—*Philipp. Journ. of Sci.*, xlv, 4, pp. 483–589, 36 pp., 1 fig., 1931.

The object of the present comprehensive investigation of the

Ganoderma applanatum group was to determine the range of structural differentiation in the variants already set up as species, with special reference to those occurring in the tropics. The results obtained by microscopic examination do not favour close segregation within the group, and the revised classification based on these studies involves a reduction of several so-called species to varieties, or their regrouping under an even broader varietal concept than that originally established for the species.

In the segregation of variants within the group only two species and four well-marked varieties are recognized, namely, *Ganoderma lobatum*, occurring in the United States and Cuba, and *G. applanatum* with its varieties *brownii*, *laevisporum* Humph. var. nov., *philippinense* var. nov., and *tornatum* Pers., with *macrospora* Humph. forma nov. as an adjunct of *tornatum*.

G. applanatum is the common temperate-zone form occurring throughout Europe and the United States, temperate South America and Africa, temperate Australia, China, Japan [see next abstract], Formosa, and occasionally at the higher altitudes in the tropics. The variety *brownii* found in California, the Canary Islands, and Java is based on the reduction of *Elfvingia brownii* Murr. to varietal rank. The variety *laevisporum*, characterized by wholly non-striate spores, occurs in Java and the Philippines; var. *philippinense*, found in the Philippines, the Federated Malay States, and Java, may be recognized by its tuberculose upper surface, the fawn-coloured streaks or bleached areas in the context, and the frequent darkening of the pore surface to mouse-grey or blackish-slate. The variety *tornatum* occurs in tropical Africa, tropical Australia, the Federated Malay States, Java, the Philippines, and Cuba; in most cases its smaller, coarsely striate spores serve to differentiate it from *G. applanatum*, but a form of this variety (*macrospora*) has spores indistinguishable from those of the type species. The spores of *G. lobatum* are intermediate between those of *G. applanatum* and the variety *brownii*.

Notes are given on the parasitism of these fungi and there is a list of the hosts hitherto recorded.

YAMANO (Y.). **On the morphology and physiology of Fomes applanatus (Fr.) Gill. and its allies.**—*Sci. Repts. Tôhoku Imper. Univ.*, Ser. iv (*Biol.*), vi, 2, pp. 199–236, 4 pl., 1 graph, 1931.

A full description, supplemented by 29 tables, is given of the writer's studies on the forms referred to *Fomes applanatus* [*Ganoderma applanatum*: see preceding abstract] and related species in Japan. Two species are recognized, viz., *F. applanatus* and *F. vegetus*. The latter [regarded by Humphrey (loc. cit.) as only a form of *G. applanatum*] differs from *F. applanatus* in the context tissue layer interposed between the tube layers. The mature spores are ferruginous, warty, obovate, becoming truncate at the base, and measure $7{\cdot}80 \pm 0{\cdot}024$ by $5{\cdot}34 \pm 0{\cdot}019$ μ. The spores of *F. applanatus* measure $9{\cdot}09 \pm 0{\cdot}03$ by $5{\cdot}88 \pm 0{\cdot}025$ μ. The hosts of *F. applanatus* in Japan include *Abies sachalinensis*, *Acer pictum*, *Diospyros kaki*, *Prunus mume*, *Quercus stenophylla*, and *Ligustrum ovalifolium*, while among those of *F. vegetus* may be

mentioned *A. pictum*, *Betula japonica*, *Fagus japonica*, *Q. grosseserrata*, *Salix urbaniana*, and *Tilia japonica*. A variety *leucostratus* of *F. vegetus*, found on dead trunks of *Q. grosseserrata*, is also described.

Van Vliet (J. I.). **Esschenkankers en hun bouw.** [Ash cankers and their structure.]—*Thesis, Univ. of Utrecht*, 73 pp., 1 pl., 24 figs., Baarn, Hollandia-Drukkerij. 1931. [German summary.]

From a survey of the relevant literature, as well as from the writer's examination of material from various parts of Holland, the Swiss Jura, and Scotland, it would appear that ash (*Fraxinus excelsior*) cankers are of two types, one being of bacterial origin as described by Noack (*Zeitschr. für Pflanzenkrankh.*, iii, p. 193, 1893) and possibly including those attributed by subsequent workers to *Pseudomonas savastanoi* [*R.A.M.*, ii, p. 12], and the other due to *Nectria galligena* var. *major* [ibid., vii, p. 677].

Bacterial cankers are of three forms, viz., verrucose, depressed, and intermediate between these two types. The verrucose cankers assume the form of large or small protuberances the entire surface of which is covered with warts. The depressed cankers are holes in the wood surrounded by a jagged edge of bark; they are of varying depth, mostly circular, but occasionally much elongated. The transitional forms include, on the one hand, depressed cankers with verrucose edges, and on the other, sunken areas with a marked tendency to healing over.

The *Nectria* cankers originate as sunken areas, which heal over and develop a verrucose surface resembling that of the above-mentioned verrucose type. The perithecia of *N. galligena* var. *major* are often found on the *Nectria* cankers. These are stated to be confined to the trunks of young trees, whereas the bacterial cankers occur on the branches as well. The protuberant and depressed bacterial cankers are never found together on the same tree.

In the verrucose bacterial cankers the diseased bark is composed chiefly of brown canker tissue, within which only a narrow strip is healthy. In those of the depressed type the canker tissue is restricted to the inner cortical layers of the edge of the canker. The diseased tissue contains many cork layers running approximately parallel to the cambium and often visible to the naked eye as pale lines. Between the cork layers are cavities filled with bacterial slime and sometimes containing hyphae, while they may also be occupied by a mass of needle crystals, probably calcium oxalate.

Below the canker tissue the structure of the cortex becomes more parenchymatous, the sclerenchyma sometimes disappearing altogether. The intercellular spaces of the cortical strips immediately inside the youngest cork layer are mostly filled completely or partially with a yellow substance, bacteria being also frequently present. The unequal development of cork in the cells adjoining the intercellular spaces causes tension in the tissues which rupture in various places. This mechanical explanation of the origin of the bacterial cavities is believed to be in accordance with all the

observed facts. The much swollen wood below the proliferating cortex is brownish and dull, the annual rings being separated from one another by a brown line. Where the cambium is killed by the parasite, healing over takes place. The wound, however, does not always close completely, so that radial fissures may develop which enlarge with the canker. Noack's observation of the penetration of the wood by the bacterium was not confirmed by the writer.

The *Nectria* cankers are conspicuous by the reddish-brown coloration of the diseased cortex, which may possibly be correlated with the high tannin content of the cells. Sometimes cavities filled with hyphae were found in the cortex, on which perithecia developed superficially. The wood vessels underlying the diseased bark also contained hyaline hyphae.

The *Nectria* canker is a true canker in Appel's and Miss Westerdijk's sense of the term (*Zeitschr. für Pflanzenkrankh.*, xxix, p. 176, 1919). In the case of the bacterial disease some doubt may be felt as to the applicability of the word 'canker'. Periodic healing over occurs, however, in this type also, the great differences between the verrucose and the depressed cankers being apparently due to variations in the intensity of this process. It seems, therefore, permissible to describe the bacterial disease as a canker in the strict sense of the word.

GARBERS (F.). **Das rätselhafte grosse Ulmensterben. Welche Massnahmen gegen das Ulmensterben?** [The mysterious widespread die-back of Elms. What measures should be taken against the die-back?]—*Gartenwelt*, xxxv, 9, pp. 113–114, 1931.

Commenting on Brill's proposal that elms in Germany should be drastically cut back in order to detect the typical discoloration due to *Graphium ulmi* [*R.A.M.*, x, p. 348], the writer points out that freshly sectioned wood is liable to assume, within 30 minutes after cutting, a brown tinge which is much prized for graining purposes. This type of discoloration does not necessarily imply infection by *G. ulmi*, which is characterized by comma-shaped streaks or circles in the youngest wood. The writer advocates the compulsory eradication of infected trees in order to save the healthy residue [ibid., x, p. 752]. As early as 1923 it was ascertained that 10 per cent. of the Bremen elm stand were diseased and 469 trees were immediately felled. At this time there was scarcely a trace of die-back in Hamburg, while Saxony also remained free from infection considerably longer than north-west Germany and Bavaria.

HÜRLÄNDER (L.). **Frühfrost die Ursache des Ulmensterbens?** [Early frost the cause of the die-back of Elms?]—*Gartenwelt*, xxxv, 9, p. 114, 1 fig., 1931.

About 20th October, 1919, there was a heavy snowfall in the Altenberge district of Münster [Westphalia], followed by a very sharp frost which lasted for a week. At this time the first symptoms of the elm disease which ultimately developed into die-back were observed, suggesting that infection by the causal

organism (*Graphium ulmi*) is favoured by severe cold. Trees in damp sites where the roots were surrounded by surface water were particularly affected. It was found that diseased elm scions did not transmit infection to the healthy stocks on which they were grafted. The recent proposal for the drastic cutting back of elms for the purpose of examination [see preceding abstract] is deprecated as likely to provide a ready means of access to the parasite through the cut surfaces [but see *R.A.M.*, x, p. 695].

Brill (O.). **Neue Beobachtungen über die Schuld des Ulmensplintkäfers.** [New observations on the complicity of the Elm sap beetle.]—*Gartenwelt*, xxxv, 9, pp. 114–115, 1931.

The writer recently examined branches cut from a stand of 200 elm (*Ulmus montana*) trees near Berlin which during the summer of 1930 showed little or no external symptoms of infection by *Graphium ulmi* [see preceding abstracts], although one-third of the total stand was afterwards found to be diseased. The feeding tracts of the elm sap beetle [*Scolytus scolytus*: *R.A.M.*, x, p. 565] were barely discernible owing to their overgrowth by the sapwood, but the work of the insects was recognizable by the small, pale, brittle areas in the medullary rays. It was further observed that there was scarcely any trace of flower buds in diseased branches of the upper parts of the crowns, apparently owing to the disturbance of the sap circulation by the excretions of the fungus. From about the beginning of January onwards this characteristic may be used to differentiate diseased from healthy elms.

Atwell (E. A.). **Occurrence of Cadophora fastigiata in Canada.** —*Phytopath.*, xxi, 7, p. 761, 1931.

Cadophora fastigiata [*R.A.M.*, ix, p. 77] has recently been isolated by the writer from stained sapwood obtained in Canada from white spruce (*Picea canadensis*), white pine (*Pinus strobus*), jack pine (*P. banksiana*), and Douglas fir (*Pseudotsuga taxifolia*). When grown in pure culture on sapwood blocks of *P. strobus* and red pine (*P. resinosa*), the fungus produced an intense grey-green stain. An unnamed fungus reported by Kress and his co-workers [ibid., iv, p. 644] as causing a grey spotting of ground wood in the United States is considered to be the same species.

Tamura (T.). **New methods of test on the toxicity and preservation value of wood preservatives.**—*Phytopath. Zeitschr.*, iii, 4, pp. 421–437, 2 figs., 1 diag., 1931.

An improved method of testing the toxicity of certain preservatives to wood-destroying fungi is described, and the results of experiments to determine its efficacy are tabulated and discussed [cf. *R.A.M.*, viii, p. 618; x, p. 357].

Culture bottles of the Kolle flask type are used, the mouths being plugged with cotton. The following preservatives were tested: creosote oil grade 1 (Tokyo Gas Co.), semi-low-temperature tar (Yokohoma Gas Bureau), basilite, malenite, triolith, and aczol [ibid., vi, p. 707 *et passim*]. The woods used were *Fagus sieboldi* and *Pinus densiflora*, test pieces of which (some impregnated with one or other of the above-mentioned preservatives at varying con-

centrations and others untreated) were laid on pure cultures of *Polystictus sanguineus*, *Schizophyllum commune* (*F. sieboldi* and *Pinus densiflora*), and *Poria vaporaria* (*Pinus densiflora*) on soy agar at 27° C. [ibid., x, pp. 71, 572]. The most suitable solvents were found to be ether or ether-alcohol for the creosote oil and semi-low-temperature tar, and distilled water for the other preservatives.

At the end of five weeks the relative efficacy of the preservatives was estimated by determining the degree of nutrient poisoning, respiration poisoning, and after-penetration. It was found that the toxicity of creosote oil (100 per cent.) was about 1 to 5 times as great as that of low-temperature tar (100 per cent.), and 1·5 to 20 and 1·9 to 17 times as great as that of basilite (the best of the other preservatives) for A (toxic limit due to the combined effects of the nutrient and respiration poisons) and B (toxic limit due to the combined effects of respiration poison and after-penetration), respectively.

In a supplementary test, blocks of treated wood were exposed to the combined effects of weathering and fungous infection for varying periods up to eight months. The woods used were *P. densiflora*, *Larix leptolepis*, *Kalopanax ricinifolius*, and *F. sieboldi*, the two former being laid on cultures of *Poria vaporaria* and the two latter on those of *Polystictus sanguineus*. It was found that basilite and malenite failed to protect the wood against infection during a month's weathering, whereas creosote oil exerted a high degree of toxicity even after eight months.

Dreifuss (M.) & Staab (A.). **Über eine Methode zur exakten qualitativen und quantitativen Bestimmung der Eindringungstiefe von Quecksilberchlorid bei der Kyanisierung von Rundhölzern.** [On a method for the accurate qualitative and quantitative determination of the depth of penetration of mercuric chloride in the kyanization of round timbers.]—*Chem. Zeit.*, lv, 52, pp. 497–498, 1 fig., 1931.

The method in current use for the determination of the depth of penetration of mercuric chloride in softwoods impregnated by the kyanization process [*R.A.M.*, v, p. 11 *et passim*] having proved unreliable, the writers devised a method involving the quantitative estimation of the mercury carried over in one hour's dry distillation of the treated wood. Very minute amounts of mercury can be determined by this method in the deeper wood layers.

Schwalbe (C. G.). **Über eine Methode zur exakten qualitativen und quantitativen Bestimmung der Eindringungstiefe von Quecksilberchlorid bei der Kyanisierung von Rundhölzern.** [On a method for the accurate qualitative and quantitative determination of the depth of penetration of mercuric chloride in the kyanization of round timbers.]—*Chem. Zeit.*, lv, 65, p. 628, 1931.

Referring to the method devised by Dreifuss and Staab for the determination of mercuric chloride in kyanized wood [see preceding abstract], the writer states that during the distillation process a certain proportion of the mercury finds its way into the

coal-tar, from which it cannot be separated by the usual means. The mercury content of the wood can be more accurately determined by the partial disintegration of the latter (lignin fraction) with dilute nitric acid. In the course of this process all the mercury passes into the nitric acid solution, where it can be determined in the ordinary way.

Replying to this criticism, Dreifuss and Staab state that no mercury could be detected, by gross analytical methods, in the burnt charcoal after distillation. Possibly an excessively minute amount might be discoverable by microanalysis, but this is regarded as immaterial. No loss of mercuric chloride through union with coal-tar during dry distillation was observed in the writers' tests, even in the case of ten-year-old timber.

Honig (F.). **Der Kohlkropferreger (Plasmodiophora brassicae Wor.). Eine Monographie.** [The causal organism of finger-and-toe disease (*Plasmodiophora brassicae* Wor.). A monograph.].—*Gartenbauwissensch.*, v, 2–3, pp. 116–225, 9 figs., 2 maps, 1931.

A comprehensive account is given of the author's original observations on the etiology of finger-and-toe disease of crucifers (*Plasmodiophora brassicae*) in Germany, together with a critical survey of the literature on the subject from the earliest records to the present day.

The average diameter of the spores of the fungus from a number of different hosts, including several kinds of cabbage, radish, and cauliflower, was 3·9 μ. The body liberated from the spore is regarded as a true amoeba [*R.A.M.*, viii, p. 4; x, p. 3] and not as a zoospore. The amoeba is devoid of cilia, and has no pulsating vacuole. The spores were found to germinate equally well in alkaline and acid solutions, germination occurring below 21° C. and in the absence of seedlings. The penetration of the root hairs by living amoeba is stated to have been observed for the first time. Larger amoebae were shown to penetrate as readily as small ones, the tip of the root hair evidently being preferred for this purpose. The capacity of the amoebae for saprophytic nutrition is presumably the cause of the increased infection following the application of organic manures. For the first time the amoebae were kept alive for several months outside the host.

A new host of *P. brassicae* was detected, viz., *Raphanus oleiferus*.

The existence of biologic strains of the finger-and-toe organism is stated to be apparently proved by the author's cross-inoculations. The strain from kohlrabi (*Brassica oleracea* [var.] *gongylodes*) is readily transmissible to kohlrabi, cauliflower, rape (*B. napus* [var.] *oleracea*), turnip, and *Camelina sativa*, while it can only be transferred with difficulty to radishes (*R. sativus* and *R. oleiferus*). The cauliflower strain was found to be completely identical with that from kohlrabi, but the strains from radish and Savoy cabbage (*B. oleracea* [var.] *sabauda*) are evidently distinct.

The application of a physiologically acid complete fertilizer resulted in an increase of infection up to 100 per cent., while a physiologically alkaline one reduced the incidence of the disease but failed to prevent it entirely.

HOLMES-SMITH (E.). **Control of club-root and root maggot of Brassicae.**—*Gard. Chron.*, xc, 2324, pp. 35–36, 5 figs. (3 on pp. 32, 33, 34), 1931.

The writer again reports excellent results in the combined control of club-root [*Plasmodiophora brassicae*] and root maggot (*Chortophila brassicae*) of cabbage and Autumn Giant cauliflowers in Lancashire and Cheshire by the application to the soil of corrosive sublimate 1 in 2,000 [*R.A.M.*, ix, p. 755]. Independent testimony to the efficacy of the treatment has also been received from growers in England, Scotland, and Ireland.

JONES (L. K.). **Treatment of Pea seed with chemical materials**—*New York (Geneva) Agric. Exper. Stat. Circ.* 118, 3 pp., 1931. [Abs. in *Chem. Abstracts*, xxv, 17, p. 4651, 1931.]

The writer's experiments have shown that the immersion of pea seed in liquid disinfectants tends to reduce the percentage of germination and stand [*R.A.M.*, x, p. 576]. Dust treatments were as effective against foot rot (*Ascochyta pinodella*) [ibid., x, p. 586] and basal stem rot (*Mycosphaerella pinodes*) as the liquid preparations. Of the dusts tested, semesan (3 oz. per bushel of seed) proved the most efficacious.

TOGASHI (K.). **Cardinal temperatures of Pea-wilt Fusaria in culture.**—*Japanese Journ. of Botany*, v, 4, pp. 385–400, 1 graph, 1931.

The author discusses and tabulates the results of his studies on the temperature relations of three species of *Fusarium* previously found to be associated with pea wilt in Japan, viz., *F. arthrosporioides*, *F. sporotrichioides*, and *F. anguioides* [*R.A.M.*, viii, p. 213], in comparison with those of *F. martii* var. *minus* and a number of other species [which are listed].

Of all the species investigated, *F. martii* var. *minus* was found to be the most thermophilic, with a mycelial growth range of 5° to over 35° C. (optimum 18° to 33°), the corresponding figures for sporulation being 10° to 35° (13° to 25°). *F. sporotrichioides* made vegetative growth from below 3° to over 33°, the optimum range for mycelial development being 18° to 30° and for sporulation 18° to 28°. In the case of *F. anguioides* mycelial growth occurred between 3° and 33°, with an optimum at 15° to 28°. The mycelium of *F. arthrosporioides* grew between 3° and more than 33°, with an optimum from 15° to 25°. Sporulation did not occur in this species. The minima for the pea wilt organisms are lower than those of any of the other *Fusarium* species studied except *Gibberella saubinetii* (*F. graminearum*) and *F. oxysporum* var. *medicaginis* (3° and below 3°, respectively). Generally speaking, the maxima of the pea wilt species of *Fusarium* were also lower than those of the others.

LACEY (MARGARET S.). **Studies in bacteriosis. XIX. Researches on the group of green-fluorescent bacteria, part I; Bacterium trifoliorum (Jones et al.) as the cause of a disease of Vicia faba.**—*Ann. of Appl. Biol.*, xviii, 2, pp. 180–186, 1 pl., 1931.

The author states that isolations from broad bean (*Vicia faba*)

plants severely affected with a bacterial rot of the stems and apical buds, and a severe leaf spotting, yielded an organism which cultural and inoculation tests showed to be identical with *Bacterium trifoliorum* [*R.A.M.*, viii, p. 176]. It is a short, aerobic, Gram-negative, non-sporulating rod with one to six polar flagella; it does not liquefy gelatine, produce indol, or reduce nitrates, and its diastatic action is weak or absent. It forms acid from dextrose, galactose, and (feebly) from saccharose, but none from lactose, mannite, maltose, dulcite, sorbite, inulin, or raffinose. Its optimum temperature for growth is 30° C. with a maximum at 37°. It grows well in Fermi's and Uschinsky's solutions, with formation of a thick mucoid yellow pellicle, and with a yellowish-green fluorescence; the latter is also produced in gelatine media, but not in bouillon or beef-extract agar, on which it forms yellowish-white colonies, the thickest part of which in old cultures frequently becomes yellow or even brown. Each type of colony can give rise to the others in replating, and all were identical in respect of virulence and cultural reactions.

Further tests showed that the organism is culturally very similar to five other bacterial pathogens, all non-liquefiers of gelatine, namely, *Bact. glycineum* [ibid., v, p. 723], *Bact. medicaginis* [ibid., ix, p. 187], *Bact. medicaginis* var. *phaseolicola* [ibid., x, p. 357], *Bact. nectarophilum* (the cause of pear blossom blight in South Africa), and *Bact. lacrymans* [ibid., x, p. 287]. In addition to these plant pathogens, two saprophytic species, namely, *Bact.* [*Bacillus*] *fluorescens non-liquefaciens* and *Bact.* [*B.*] *striata* (found in soil), also show close cultural agreement with *Bact. trifoliorum*, but inoculations of broad beans with these two organisms invariably gave negative results. The resemblance of these saprophytic strains to the pathogenic strains is, however, so marked as to raise once again the question, suggested by various authors, whether all the pathogens of the green fluorescent group are not parasitic strains of *Bact.* [*B.*] *fluorescens liquefaciens* or *B. fluorescens non-liquefaciens*.

LEHMAN (S. G.). **Observations and experiments relating to the bacterial pustule disease of Soybean.**—*Journ. Elisha Mitchell Sci. Soc.*, xlvi, 2, pp. 179–189, 1931.

Bacterium phaseoli [var.] *sojense*, the causal organism of the bacterial pustule disease of soy-beans [*R.A.M.*, ix, pp. 289, 359], was isolated at the North Carolina Agricultural Experiment Station from lesions on the Tar Heel Black variety showing no sign of pustular development. It is believed that intumescence, though frequently present, is not a necessary concomitant of infection by *Bact. phaseoli* var. *sojense*, and that the absence of pustules from lesions does not prove the latter to be due to some other cause. On the Mammoth Brown variety, however, the pustulate lesions greatly exceeded the non-pustulate, and the latter type did not occur on any of the other varieties examined.

The results [which are discussed and tabulated] of inoculation experiments on the Biloxi variety showed that infection was heavier on plants kept at a uniform temperature of 30° to 33° C. than on those exposed to fluctuations between 22° and 30°. Very

few lesions developed on inoculated plants when the air temperature ranged from 15° at night to 25° during the hottest part of the day. Tests on the Herman variety showed that susceptibility to the bacterial pustule disease diminishes rapidly with increasing maturity of the leaf.

Bact. phaseoli var. *sojense* was found to be viable for at least three months in decaying leaves and for nine months in dry ones, thus giving ample time for the perpetuation of the disease from one season to the next.

LEHMAN (S. G.). **Powdery mildew of Soybean.**—*Journ. Elisha Mitchell Sci. Soc.*, xlvi, 2, pp. 190–195, 3 figs., 1931.

In January, 1928, seedling soy-bean plants in a greenhouse at the North Carolina Agricultural Experiment Station were observed to be affected by a powdery mildew which produced a dull grey spotting of the upper sides of the leaflets and a pale pink to deep vinaceous colouring of the tissues, the latter symptom being most conspicuous on the lower surfaces. A similar type of mildew had been present for some weeks on garden beans [*Phaseolus vulgaris*] on the opposite side of the greenhouse in a much more severe form, and is believed to have spread from these plants to the soy-beans.

The conidia from both hosts showed a similarity of form (elliptical with flattened ends). The measurements of 52 conidia from beans gave a range of 26 to 52 by 16 to 23 μ with a mean of 36·5 by 19·4 μ; the number of turgid conidia from soy-beans was insufficient for comparison, but they appeared to be approximately similar. Inoculation experiments with conidial suspensions of the fungus from garden beans (identified as *Erysiphe polygoni*) on the same host and soy-beans gave positive results only in the former case, presumably owing to the existence of physiologic strains within the causal organism [*R.A.M.*, vi, p. 511]. There is considered to be no doubt that the conidia found on the Morse soy-beans were those of *E. polygoni*, the only previous record of which on this host in the United States appears to be from North Carolina in 1921.

WERNECK (H. L.). **Neue Wege zur Bekämpfung der Blattfleckenkrankheit der Zuckerrübe.** [New methods in control of the leaf spot disease of the Sugar Beet.]—*Fortschr. der Landw.*, vi, 14, pp. 454–456, 1931.

In 1929 the sugar beet crops of Upper Austria were severely attacked by leaf spot (*Cercospora beticola*), which caused losses of 15 to 40 per cent. in localities up to 450 m. above sea level [*R.A.M.*, ix, p. 576]. It was found that the disease occurred in all those fields receiving their full measure of stable manure and synthetic fertilizers in one dose in the spring, while it was practically absent from those to which nitrogen was applied (especially in the form of liquid manure) at the second hoeing from 15th June to 1st July. The incidence of infection was also low among beet crops following clover. It would seem that a deficiency of nitrogen during the cool, wet weather normally associated with the critical period for infection (latter part of June and early days of July) lowers the resistance of the plants to the

fungus, which reaches its optimum development at this time. In 1930, when the whole month of June was hot and dry in the region under discussion (along the Danube from Passau to Pressburg), the incidence of leaf spot was negligible. In normal seasons a further application of liquid manure at or immediately after the second hoeing is likely to prove beneficial.

Attention is drawn to the work of Chrzanowsky (*Landw. Versuchsw.*, (Warsaw), iii, 3 and 4, 1927) on leaf spot of beets in Poland, a German summary of which appeared in *Pflanzenbau*, vi, [p. 348], 1930. This investigator also found a reduced amount of infection among beet crops following clovers and lupins, and suggested that this was possibly on account of the action of the nitrogen and the increased porosity of the soil. He also got excellent results by the application of one-third of the normal nitrogen allowance, in the form of saltpetre, during the period from 25th July to 15th August.

CURZI (M.). **Intorno alle infezioni cercosporiche dell' 'Arachis hypogea' L.** [On *Cercospora* infections of *Arachis hypogea* L.]—*Boll. R. Staz. Pat. Veg.*, N.S., xi, 1, pp. 84-97, 8 figs., 1931.

After briefly reviewing some of the recent literature dealing with *Cercospora* infection of groundnuts and fully describing his own observations on the morphology of *C. personata* [*R.A.M.*, vi, p. 398 *et passim*] on groundnut leaves received from Italian Somaliland, the author states that up to the present this is the only species of *Cercospora* definitely known as parasitizing this host, and in all probability various strains exist which differ morphologically as well as in their parasitism. *Septogloeum arachidis* Rac. (1898) and *C. arachidis* P. Henn. (1902) agree in their main characters with *C. personata* and should be regarded as synonymous with it. *C. arachidis* var. *macrospora* Maff. [ibid., ii, p. 174] should remain a distinct variety of *C. personata* until their systematic relationship has been definitely ascertained.

A bibliography of 26 titles is appended.

STANER (P.). **Mosaïque des feuilles de Manioc.** [Mosaic of Cassava leaves.]—*Bull. Agric. Congo Belge*, xxii, 1, pp. 75-80, 2 figs., 1 plan, 1931.

After briefly describing the symptoms of mosaic disease of cassava [*R.A.M.*, x, p. 639] in the Belgian Congo the author gives an account of inoculation experiments in which cuttings from healthy and mosaic plants were set in proximity to one another, some under insect-proof cages, and the plants which grew from the healthy cuttings inoculated with the filtered and unfiltered juice expressed from the leaves of mosaic cassava plants; the inoculations were made by rubbing, in the stalk, leaf petioles, and leaves. Insects of various [named] species taken from diseased cassava were placed on the leaves of the plants in one cage. All the inoculations gave negative results. The author concludes that this disease of cassava is probably due to a bacterium. It is pointed out that healthy and diseased shoots are frequently noted

growing from one and the same tuber, an indication that the disease is localized.

PETRI (L.). **Sull' 'arriciamento' della Vite.** [On leaf roll of the Vine.]—*Boll. R. Staz. Pat. Veg.*, N.S., xi, 1, pp. 61–83, 1 pl., 11 figs., 1931.

After describing in detail the characters shown by the hypertrophied cells of the apical meristem of the young roots of Rupestris du Lot vines affected with leaf roll [*R.A.M.*, ix, pp. 83, 761], resulting in club-shaped swellings of their tips, the author states that no confirmation has hitherto been obtained of the probable relation which exists between the intracellular bodies, somewhat resembling plasmodia, which he described in 1918 (*Rendic. R. Accad. Lincei, Cl. Fis., Mat. e Nat.*, xxvii, p. 271) and which finally fill the hypertrophied, generally plurinucleate, cells of the swellings, and the vacuolate bodies present in the cambial cells of other parts of the plant, near the nuclei. Further evidence was obtained of the close analogy existing between the vacuolate bodies and the 'X' bodies found in plants affected with virus diseases [ibid., ix, p. 539]. The presence of the intracellular cordons [ibid., ix, p. 83] is still regarded as diagnostic, and has been noted also in vines affected by court-noué which the author had examined from France.

The author considers that leaf roll is certainly infectious and that it has been fully demonstrated that the disease is soil-borne and also transmissible by contact between diseased and healthy roots. It is probably caused by a virus, whose ultramicroscopic, filterable stage is present in the cambium, and whose reproductive, microscopically visible stage develops in the root tips.

PIGUET (G. A.). **Contribution à l'étude des vins de Raisins grêlés et coîtrés.** [Contribution to the study of wines made from Grapes attacked by hail and 'coître'.]—*Ann. Agric. de la Suisse*, xxxii, 2, pp. 155–166, 1931.

Some general observations, supplemented by experimental and analytical data, are made in connexion with the deleterious effects of the hail disease or 'coître' of vines (*Coniothyrium diplodiella*) on the flavour and keeping quality of the wines made from affected grapes in the canton of Vaud (Switzerland) [*R.A.M.*, x, p. 157]. Suggestions are further made for the avoidance of these defects by various precautions in the vinification processes.

WORMALD (H.). **Notes on plant diseases in 1928–1930.**—*Ann. Rept. East Malling Res. Stat., 1928, 1929 and 1930, II supplement*, pp. 123–132, 1931.

This account of plant diseases observed at East Malling Research Station, Kent, or received from growers, in 1928 to 1930, contains the following items of phytopathological interest besides those already noted from other sources [*R.A.M.*, viii, p. 545; x, pp. 158, 250, 322, 358].

Sooty blotch of apples, closely resembling the disease caused by *Gloeodes pomigena* in America [ibid., viii, p. 154; x, p. 801] was very prevalent in 1927 and 1930, but was apparently checked by

the dry summers of 1928 and 1929. The commonest type of disfigurement consisted of blotches about one quarter of an inch in diameter, sometimes coalescing into large, well-defined, almost circular patches, and studded with minute black dots consisting of an aggregation of fungal cells. In September, 1930, a similar form of sooty blotch was observed on Warwickshire Drooper and Cambridge Gage plums, this being apparently the first record of the disease on this host.

A leaf spot of *Yucca*, in which some of the spots showed concentric markings and the larger ones bore the fructifications of *Coniothyrium concentricum* [ibid., ix, p. 204], was observed in an East Malling garden. Young *Thuja lobbi* trees at East Malling were affected by the leaf spot due to *Keithia* [*Didymascella*] *thujina* [ibid., vii, p. 59].

In 1929 lesions containing bacteria were observed on the flowers and spurs of pear trees soon after blossoming, the symptoms of the disease resembling those caused at Long Ashton by *Bacillus barkeri* [ibid., iv, p. 469; v, p. 470]. An organism was isolated from the diseased material, which, when inoculated into young pear fruits, caused blackened lesions, though similar inoculations on pear flowers gave negative results. The organism, the identity of which has not yet been established, can be distinguished from *B. barkeri* by certain cultural characters; it is more nearly related to *Pseudomonas prunicola* [see below, p. 58], which causes a bacterial wilt of plum shoots.

During the first week of July, 1929, cherries showing blackened lesions swarming with bacteria were received from Newington. An organism was isolated from the spots, and this, when inoculated into cherries in the laboratory, produced lesions; in 1930, cherry fruits growing in the open were also inoculated and the results were again positive. This organism also appears to be closely related to *P. prunicola*.

Pathologie végétale. [Plant pathology.]—*Rapport sur le fonctionnement de l'Inst. des Recherches Agron. pendant l'année 1930*, ix, pp. 411–445, 1931.

This report contains, among numerous others, the following items of phytopathological interest other than those already noticed from different sources. Studies at Grignon of the effect of wheat bunt [*Tilletia caries* and *T. foetens*: *R.A.M.*, x, p. 303] on the development of artificially infected Bon Fermier plants demonstrated that the length of the bunted shoots to the base of the ears averaged 10 per cent. shorter than the healthy ones. That the fungus was still viable in the base of the culms at the time of spore production was shown by the fact that suckers developed during damp weather after ear formation on lodged plants bore affected ears.

Puccinia glumarum was noted on cereals on 24th January, 1930, at Versailles, on 14th February at Grignon, and during the winter at Clermont-Ferrand; *P. triticina* was observed on cereals on 14th February at Grignon and during the winter at Clermont-Ferrand. The relative susceptibility to these rusts of a number of the wheat varieties grown at Clermont-Ferrand is indicated. In

none of these localities were any pustules of *P. graminis* observed on cereals during the winter of 1929–30.

The Imperia variety of potatoes, imported from Sweden, and considered to be resistant to leaf roll [ibid. vii, p. 596], had remained free from this disease during the four years that it had been grown at Grignon, but became contaminated in 1928 through proximity to diseased potato plants. A study of the progeny of diseased plants showed reductions in yield of 14 and 44 per cent. for 1929 and 1930, respectively.

In Alsace and one other locality in France a disease of tobacco characterized by the presence of a brown canker on the main stem was observed; in advanced stages of the disease (seen only in the department of Bas-Rhin) the plants wilted. A thick, intercellular, varicose mycelium was present in the affected tissues, and on isolation the fungus was determined as *Phytophthora parasitica* var. *macrospora* [ibid., vii, p. 601; see also viii, p. 674].

Hops previously attacked by *Gibberella saubinetii* [ibid., viii, p. 264] became freed from infection when transplanted into well tilled soil in the hop-garden, where they grew vigorously. In this particular instance, the hops appear to have become infected largely as a result of weakness.

Investigations conducted since 1927 into die-back of apricot trees in the Rhone valley [ibid., viii, p. 656; ix, pp. 255, 465; x, p. 529] indicated that necrosis of the wood is frequently an important concomitant of this condition. Numerous observations made in 1930, mostly on trees four to twelve years old, showed that these lesions were present on nearly all parts of the trees, affecting one or more of the younger annual rings. A tree may be infected from the roots to the twigs, or even to the petioles. Isolations from the lesions in the wood showed the presence of *Verticillium dahliae* in proportions up to 85 per cent. In many cases, however, the organisms present included bacteria and species of *Fusarium*, *Coryneum*, and *Alternaria*, infection by which was always traceable to a wound and, unlike the *V. dahliae* infections, was restricted to only a part of the tree. Die-back of peaches in the Rhone valley [ibid., viii, p. 180] was also associated with lesions in the wood. Isolations from affected parts gave organisms closely resembling or identical with those found in apricots affected with the same condition. A particularly important part in the causation of the disease in peaches, however, appears to be played by *Polyporus* [*Fomes*] *fulvus* [ibid., ix, p. 188] the sporophores of which were very frequently found on peach trees subjected to severe pruning.

Hysterangium boudieri, a rare fungus in the Alpes Maritimes, was found to pass through the first stages of its life-cycle as a parasite on the roots of *Iris unguicularis* and narcissus. This is stated to be the first occasion that the parasitism of a species of this group of fungi has been definitely established.

Infection tests with *Phyllosticta rabiei*, the causal organism of anthracnose of chick peas (*Cicer arietinum*) [ibid., ix, p. 697], on 36 types of the host from northern Africa and the south of France resulted in two pure lines of *C. arietinum* var. *album* and one of *C. arietinum* var. *nigrum* being found completely resistant.

FAES (H.). **Station fédérale d'essais viticoles à Lausanne et Domaine de Pully. Rapport annuel 1930.** [Annual report for 1930 of the Federal Viticultural Experiment Station at Lausanne and Domaine de Pully.]—*Ann. Agric. de la Suisse*, xxxii, 3, pp. 273–310, 3 graphs, 1931.

In addition to various other items of phytopathological interest in connexion with vines and fruit trees [cf. *R.A.M.*, x, p. 10], the following may be mentioned. The conditions for the development of downy mildew of the vine (*Peronospora* [*Plasmopara*] *viticola*) were more favourable during the wet summer of 1930 than for many years past. Good control of the disease was uniformly obtained by eight applications of Bordeaux mixture supplemented by two of a copper or sulphur dust [ibid., x, p. 9]; the exclusive use of dusts cannot be recommended under the climatic conditions prevailing in the canton of Vaud. Skim milk, casein, or some other standard spreader should be added to the Bordeaux mixture.

The causal organism of coître (*Coniothyrium diplodiella*) [see above, p. 21] was found to retain its germinative capacity and virulence for at least ten years.

Attacks of root rot (*Rosellinia necatrix*) occurred on vines [ibid., ix, p. 360] during the period under review.

Septoria gladioli [ibid., x, p. 645] was found on gladioli, this being the first record of the fungus for Switzerland.

LEPIK (E.). **Fütopatoloogilised märkmed 2–8.** [Phytopathological notes 2–8].—*Mitt. Phytopath. Versuchsstat. Univ. Tartu* (*Esthonia*) 7, 14 pp., 8 figs., 1931. [German summary.]

During the period from 1925 to 1929, gooseberry rust (*Puccinia ribes-caricis*) occurred in a very destructive form in Esthonia, generally affecting up to 50 per cent. of the crop, and in extreme cases rendering all the fruit unfit for consumption [cf. *R.A.M.*, vii, p. 618]. In order to determine whether the mycelium is capable of overwintering in the young twigs or buds, one series of branches was isolated in glass cylinders before the unfolding of the leaves, while another lot was planted out under specially constructed glass vessels. All the isolated branches remained free from rust, which severely attacked the adjacent non-isolated ones. It would appear, therefore, that the mycelium of *P. ribes-caricis* does not overwinter in the bushes. The American mountain gooseberry (*Ribes montana*) was found to be immune from rust, whereas all the European varieties derived from *R. grossularia* are very susceptible. Among the resistant varieties tested at Dorpat in 1930 were Houghton, Seedling, Pearl, and Duke, while Green Willow, Columbus, Prince of Orange, Crown Prince, and others were very susceptible.

Neither powdery scab (*Spongospora subterranea*) nor wart disease (*Synchytrium endobioticum*) of potatoes has yet been found in the country, and legal measures are in force to prevent their introduction.

In 1930 the first aecidia of *P. graminis* were observed at Dorpat on 17th May on *Berberis vulgaris*, *B. thunbergii* remaining free from infection.

The excessively mild winter of 1929–30 greatly favoured the

development and spread of clover canker (*Sclerotinia trifoliorum*) [ibid., x, p. 669], which caused 10 to 60 or even up to 90 per cent. injury to the crops. *Epichloe typhina* [ibid., viii, p. 314] occurred in epidemic form on meadow grasses in the north of the country.

Flax was attacked by *Phoma exigua* [ibid., ix, p. 246] in the south-west in 1929.

The following fungi causing tomato diseases have been recorded in Esthonia: *Phytophthora infestans*, *Fusarium* sp., *Cladosporium* sp., *Verticillium albo-atrum*, *Botrytis cinerea*, *Septoria lycopersici*, *Bacterium lycopersici* [ibid., vi, p. 132], *Phoma lycopersici*, and *C. fulvum*, the two last-named having caused very severe injury in 1929 and 1930, respectively. Girth scab of beets, associated with *Oospora cretacea* [*Actinomyces cretaceus*], *A. rosellus*, *A. intermedius*, *A. tenax*, *A. nigrificans*, and *A. violaceus*, was very injurious in 1930 following the mild winter [cf. ibid., i, p. 183; viii, p. 9].

HOPKINS (J. C. F.). **A list of plant diseases occurring in Southern Rhodesia.**—*Rhodesia Agric. Journ.*, xxviii, 7, pp. 663–669, 1931.

This list of plant diseases recorded in Southern Rhodesia between June, 1930 and May, 1931 has been drawn up in continuation of that previously issued [*R.A.M.*, ix, p. 684], certain amendments to which are included.

SMITH (F. E. V.). **Plant diseases in Jamaica in 1930. Report of the Government Microbiologist.**—*Ann. Rept. Dept. of Sci. and Agric. Jamaica for the year ended 31st December, 1930*, pp. 15–19, 1 pl., 1931.

Owing to dry weather conditions there was no marked spread of Panama disease of bananas (*Fusarium cubense*) in Jamaica during the later months of 1930, but nevertheless the incidence of infection was 100 per cent. more than in 1929 [*R.A.M.*, x, p. 43 and below, p. 6]. Field experiments showed that a 10 per cent. solution of Jeyes' fluid or septol was superior to the normal concentrations of corrosive sublimate, bleaching powder, or formalin in the disinfection of the soil against this disease. It is stated on p. 1 that the first cross seedlings of the Gros Michel variety pollinated with Robusta are highly resistant to *F. cubense*. Bonnygate disease and black spot (*Sphaerostilbe musarum* and *Cercospora musarum* [*Helminthosporium torulosum*: ibid., ix, p. 729]) were also prevalent, while *Marasmius* disease [*M. stenophyllus*: ibid., vii, p. 226] occurred in 'Bush' bananas. Chlorosis was much in evidence on marl or limestone soils.

Sugar-cane mosaic was found on most estates, but generally in a fairly mild form, especially where roguing and selection are regularly practised. On p. 8 it is stated that the resistant Uba is gradually being superseded by the P.O.J. varieties, and in some districts where mosaic was formerly very prevalent certain of the more susceptible varieties can now be grown again.

Scab (*Sporotrichum citri*) of sour oranges [*Citrus aurantium*] and lemons was kept well in check in nurseries by systematic spraying with Bordeaux mixture, beginning at the appearance of

the first rough leaves. Where the work of control was not commenced until a later stage good results were obtained by pruning back the affected shoots before spraying. In order to secure nurseries free from scab it is necessary to destroy all sour orange trees in the immediate vicinity before sowing the seed. Wither-tip [*Gloeosporium limetticolum*] was general but not often severe on limes, and also occurred in two young mixed groves of grapefruit and orange. Most of the trees had been budded on grapefruit stock, and the Triumph variety on this stock was severely affected, while Marsh Seedless grapefruit showed less infection and Washington Navel orange on the same stock least of all. Minor troubles of citrus, generally occurring in old trees, include scaly bark, gummosis, and foliocellosis [ibid., x, p. 25] while *Diplodia natalensis* is the cause of considerable loss to growers in certain localities.

Damping-off of coffee (*Rhizoctonia* [*Corticium*] *solani*) is still common in nurseries but is amenable to treatment with Cheshunt mixture [ibid., i, p. 373].

Common scab of potatoes (*Actinomyces scabies*) was serious in some light red soils deficient in humus, while early blight (*Macrosporium* [*Alternaria*] *solani*) was the most severe leaf disease, spraying being ineffectual as a control measure. *Sclerotium rolfsii* was reported as the cause of damage to potato shoots at soil level.

Mosaic of papaw, also reported from San Domingo [ibid., ix, p. 512; x, p. 809], is characterized by dwarfing of the leaves and the production of 'pencil point'; it is prevalent throughout the Island and would necessitate the development of an immune variety (which is believed to exist) in the event of the commercial cultivation of this crop.

Peas were attacked by the root rot due to *Aphanomyces euteiches*.

MARTYN (E. B.). **Plant diseases.**—*Agric. Journ. Brit. Guiana*, iv, 2, pp. 95–100, 2 pl., 1931.

Notes are given on the wilt disease of coco-nuts attributed to unfavourable soil conditions [cf. *R.A.M.*, vii, p. 716; x, p. 361], Panama disease of bananas (*Fusarium cubense*), *Sclerotium* disease of coffee [*S. coffeicolum*: ibid., ix, p. 650], witches' broom of cacao [*Marasmius perniciosus*], wither-tip of limes [*Gloeosporium limetticolum*], and on tomato wilt (*Fusarium lycopersici*) and blossom-end rot [cf. ibid., viii, p. 426].

[WALTERS (E. A.).] **Report on the Agricultural Department, St. Lucia, 1930.**—24 pp., 1931.

In the section of this report dealing with plant diseases (p. 6) it is stated that *Rosellinia* disease of cacao [*R. bunodes* and *R. pepo*: *R.A.M.*, x, p. 161] causes more loss of yield in St. Lucia than any other disease or pest of this host. The replacement of the very susceptible shade tree 'Immortelle' [*Erythrina* spp.] by the highly resistant *Gliricidia* is consistently advised wherever the fungus is prevalent. The use of a tar distillate wash considerably improved the bark wounds and pod rots [*Phytophthora palmivora* and *Botryodiplodia theobromae*] in several plantations.

The survey of coco-nut palms begun in 1927 [loc. cit.] was com-

pleted in 1930, and a definite record of disease sites is now available. The number of trees examined from November, 1927, to May, 1930, totalled 462,704, of which 1,169 or 0·25 per cent. were diseased, all the latter being destroyed, treated, or kept under observation. The percentage incidence of disease was as follows: bud rots [*P. palmivora* or bacteria] 38·7, little leaf 30·8, bitten leaf [?*Ceratostomella paradoxa*] 12·7, stem bleeding 7·1, leaf yellows 5·7, senility 4·3, and withering leaf 0·7 [ibid., ix, p. 90].

Brooks (A. J.). **Annual Report of the Department of Agriculture, Colony of the Gambia, for the year ended March 31st, 1931.**—51 pp., 1 pl., 1931.

This report contains (pp. 8, 18, 22) the following items of phytopathological interest. The leaves and roots of Philippine Pink groundnuts were attacked by *Macrophomina phaseoli*. On the leaves large, marginal, zonate spots developed. The pycnidia which occurred on the spots of one leaf contained pycnospores measuring 20 to 27 by 7 to 8·5 μ, and these gave rise to the sclerotia of *Rhizoctonia bataticola* in culture. The root attack caused a complete decay of the tap-roots, which were bare to the wood and bore abundant sclerotia of the fungus. *Cercospora personata* was present on all varieties of groundnuts, but all except Philippine Pink eventually recovered. Rosette [*R.A.M.*, x, p. 629] made its appearance about the middle of August, the available evidence indicating that it was insect-borne. In late sowings Philippine Pink groundnuts were more resistant to rosette than either the Basse or the Philippine White variety. The date of the first appearance of the disease depends mainly on seasonal factors, being little affected by the date of sowing.

Plant pathology and physiology.—*Forty-third Ann. Rept. Texas Agric. Exper. Stat., 1930*, pp. 56–67, 1930. [Received September, 1931.]

In the section of this report dealing with investigations conducted during the period under review into cotton root rot (*Phymatotrichum*) [*omnivorum*: *R.A.M.*, x, p. 454] in Texas notes are given on the conditions under which the sclerotia are found, how soon they germinate, and their longevity [ibid., x, p. 186]. The *Hydnum* [loc. cit.] frequently associated with plants killed by *P. omnivorum* does not appear to be related to the latter fungus, no infection being secured when cotton plants were inoculated with the *Hydnum* sporophores.

Further observations showed that *Fusarium lycopersici* [ibid., x, p. 165] is present on tomatoes in different types of soil in Texas, from slightly acid or neutral to highly calcareous. Heavy losses were incurred by tomato growers in all parts of Texas during 1930 from a disease known as 'centre' or 'core' rot, which takes the form of a dark, central spot, not affecting the edible quality of the tomatoes, but making them unmarketable. A yellow and a white bacterium were repeatedly isolated from affected fruit and inoculations of healthy tomatoes with either organism gave positive results. A new form of tomato decay, referred to as 'charcoal rot', in which both the outside and inside of affected fruits turn

black, was also observed, and a fungus was repeatedly isolated from infected material; inoculations of healthy tomato with this organism, which morphologically resembled *Sclerotium bataticola* [*Macrophomina phaseoli*], gave positive results. Spinach wilt (*Fusarium solani*) [ibid., v, p. 405; vi, p. 140] seriously hindered the growth of this crop in south Texas, particularly in the Winter Garden District, the losses varying from 5 to 25 per cent.

Sulphur used in any form to control downy mildew (*Peronospora* [*Pseudoperonospora*] *cubensis*) and powdery mildew (*Erysiphe cichoracearum*) of cantaloupes [ibid., ix, p. 437; x, p. 702], when applied to the foliage was highly injurious to the leaves and vines. Neutral Bordeaux mixture gave the best results, as judged by the yield, the degree of control over both diseases, and the amount of spray injury caused; it was the only treatment which gave a greater yield than was obtained from the untreated controls. When the sulphur, however, was placed on the ground next to the vines and foliage, the applications being made when the plants first began to vine out and repeated frequently as they developed, no injury resulted, and both diseases, which destroyed the untreated controls in this experiment, were apparently controlled.

Kolodust, when applied dry to numerous hosts for the control of powdery mildews, including peas and beans [*E. polygoni*] and roses [*Sphaerotheca pannosa*], was readily washed off by the lightest rain, but when applied immediately after rain or a water spray and then allowed to dry, it adhered much longer than did ordinary flowers of sulphur. Three applications of kolodust gave almost complete control of carnation rust [*Uromyces caryophyllinus*: ibid., ix, p. 654]; ordinary flowers of sulphur were less effective.

Progress in agricultural research.—*Ann. Rept. Missouri Agric. Exper. Stat. for the year ending June 30, 1930* (*Bull.* 300), 107 pp., 6 figs., 1 diag., 9 graphs, 1931.

The following are amongst the items of phytopathological interest (other than those already noticed) in the sections on botany (pp, 56–58) and horticulture (pp. 85–91) of this report. I. T. Scott has continued his studies of various species of *Fusarium* parasitic on economic hosts in Missouri. The following hydrogen-ion equilibrium points were obtained: *F. discolor*, P_H 5·3 to 5·5; *F. niveum*, P_H 6·4 to 6·5; *F. vasinfectum*, P_H 5·5: *F. conglutinans*, P_H 6·8 to 7. A minimum of growth, measured as dry weight of mycelium produced, was obtained at about P_H 7 when *F. conglutinans* was grown in nutrient solutions of different initial P_H values. This growth corresponded closely to the equilibrium point reached when washed mycelial mats of the same fungus were placed in acid or basic salt solutions. There was a definite correlation between the growth of the fungus at different hydrogen-ion concentrations and the equilibrium points obtained in salt solutions, and also a connexion between reaction and the toxicity of various dissociating toxic agents, as previously reported in the case of *F. lycopersici* [*R.A.M.*, vi, p. 367; ix, p. 197].

Pythium arrhenomanes Drechsler, the causal organism of a seedling blight of Dent maize [ibid., vii, p. 778; x, p. 180], was

isolated from diseased maize roots obtained from previously unaffected parts of the State. Seed treated with organic mercury dust disinfectants gave a decreased percentage of infection when planted in *Pythium*-infested soil in the greenhouse. *P. arrhenomanes* appeared to be much more virulent in soil inoculation experiments in the greenhouse when used alone than in conjunction with *Gibberella moniliformis* and *G. saubinetii.*

JAVORONKOVA (Mme I.). Практикум по бактериозам растений. [Practical guide for the study of bacterioses of plants.]—Booklet issued by *Госуд. С.-хозяйств. Издат.* [*State Agric. Publications Office*], Moscow and Leningrad, 64 pp., 18 figs., 1931.

The first part of this booklet, which is intended to serve as a practical guide for the beginner in the study of bacteriology, gives brief but comprehensive instructions for the isolation and growth in pure culture of phytopathogenic bacteria, and also for the preparation of the more usual culture media. The second part is a list (together with brief morphological and cultural descriptions) of the more important species of bacteria that attack economic crops in Russia, arranged by the hosts.

NOLLA (J. A. B.). **Studies on the bacterial wilt of the Solanaceae in Porto Rico.**—*Journ. Dept. Agric. Puerto Rico*, XV, 3, pp. 287–308, 4 pl., 1931.

Solanaceous plants in Porto Rico are stated to be liable to a bacterial disease, the causal organism of which is believed to be a strain of *Bacterium solanacearum* differing from the type species in its inability to infect tobacco.

Four potato varieties, viz., Bliss Triumph, Irish Cobbler, Green Mountain, and Spaulding Rose, were found to be susceptible, while severe infection occurs also on a number of imported eggplant varieties, e.g., Black Beauty, Excelsior, New York Spineless, and Large Round Purple, and tomatoes, especially Ponderosa. Pepper (*Capsicum baccatum*) is also susceptible, though less so than the foregoing, the heaviest infection being found on Early Giant and Ruby Giant and the least on Chinese Giant, Worldbeater, and Bull Nose. The Porto Rican eggplant, varieties, Camuy and Long Green, are highly resistant to *Bact. solanacearum* and the Marglobe and Marvelosa tomatoes moderately so. Bacterial wilt has also been observed on zinnia (*Crassina* [*Zinnia*] *elegans*), *Solanum torvum*, and *S. nigrum.*

The symptoms of bacterial wilt include yellowing and withering of the young shoots and leaves, followed by general wilting of the whole plant, and sometimes accompanied by lesions resembling those due to scalding water or scorching by strong sunlight. Cankers are occasionally formed in tomatoes. The vascular bundles of diseased plants show a brown discoloration.

The causal organism was found to lose its virulence very rapidly on most artificial media. Successful inoculations were obtained when the inoculum was used directly from the original isolation on the poured plate, while those made with the bacterial exudate obtained in a more or less uncontaminated state from the vascular

bundles of diseased plants scarcely ever failed. Natural infection takes place through wounds in the leaves and roots. The green beetle (*Diabrotica graminea*) was found to be concerned in the dissemination of the pathogen, which appears to remain viable in the soil for a number of years in manure, plant débris, and the like. The first appearance of the bacterial wilt has been observed to coincide with periods of protracted rainfall followed by dry spells. A promising means of control is offered by the development of resistant strains of the affected plants, and breeding experiments with the eggplant are already in progress.

NABELEK (A.). **Le cancer des plantes, maladie des cicatrices.** [Plant cancer, a cicatricial disease.]—Reprinted from *Les Néoplasmes, 1931*, 24 pp., 16 pl. (4 col.), 1931.

This is a French version of the author's previously noticed paper on the problem of cancer in plants associated with infection by *Bacterium tumefaciens* [*R.A.M.*, x, p. 708].

CIFERRI (R.). **Studies on Cacao.**—*Journ. Dept. Agric. Puerto Rico*, xv, 3, pp. 223–286, 1 pl., 1 diag., 6 graphs, 1931.

During 1926 and 1927 the writer carried out investigations in the Dominican Republic on (*a*) the numerical distribution of the mould spores on dry fermented and unfermented healthy cacao beans, as well as on moulded ones; (*b*) the identification of the moulds isolated; and (*c*) the comparative growth of the most common moulds on pasteurized fermented and unfermented cacao beans [*R.A.M.*, vii, p. 22; ix, p. 163].

The following organisms were found to be normally present in samples of Sánchez cacao beans: *Aspergillus niger*, *A. fumigatus* [ibid., ix, p. 632], *A. flavus*, *A. glaucus*, *Penicillium leucopus*, *Rhizopus nigricans*, *Mucor mucedo*, *Spicaria lateritia*, and *Cephalosporium acremonium*, while others of less frequent occurrence were *A. tamarii*, *A. nidulans*, *A. candidus*, *P. notatum*, strains of *Penicillium* closely related to, or identical with, *P. luteum*, *P. roseum*, and *P. candidum*, *R. arrhizus*, *M. racemosus* or a closely allied strain, *Trichothecium roseum*, *Helminthosporium cacaophilum* Cif. n. sp., *Macrosporium commune* [*M. sarcinula*: ibid., x, p. 430], *Pullularia* (*Dematium*) *pullulans*, *Alternaria tenuis*, *Catenularia fuliginea* [*Torula sacchari*: ibid., x, p. 656], *Dendryphium congestum* Cif. n. sp., (?) *Coniothecium effusum*, *Blastoconium tropicum* Cif. n. g., n. sp., (?) *Hormodendrum pallidum*, *Fusarium sarcochroum* or a closely related form, and a variety of *F. zonatum*. Notes are given on the two last-named, and English diagnoses of the new species are furnished.

The normal moisture content of fermented and unfermented cacao beans was found to range from 14 to 21 per cent., with a general average of 19 per cent. It was ascertained that a relative humidity of 79 per cent. permits the development of moulds after 16 days' incubation on fermented cacao, the minimum time required for this process being 8 days at a relative humidity of 90 per cent. It is concluded from these studies that both climatic and meteorological conditions in the Dominican Republic are often favourable to the development of moulds on cacao beans, especially in conjunc-

tion with the defective methods of cacao preparation in common use. Some suggestions are made for the improvement of these methods, with particular reference to drying, as well as for better conditions of storage.

The second part of this paper deals with the yeasts occurring in Dominican cacao. [A French summary of this paper is published in *Boll. Sez. Ital. della Soc. Internaz. di Microbiol.*, iii, 10, pp. 666–671, 1931.]

Appel (O.) & Scheibe (A.). **Beobachtungen über die Verbreitung der einzelnen Getreiderostarten in Deutschland, insbesondere im Jahre 1930.** [Observations on the distribution of the individual cereal rust species in Germany, especially in the year 1930.]—Reprinted from *Mitt. Deutsch. Landw. Gesellsch.*, [xlvi], 4, 2 pp., 1931.

During 1930 a systematic survey was made of 577 collections of cereal rusts from different parts of Germany. The first record of dwarf rust on barley (*Puccinia simplex*) [*P. anomala*] was dated 24th May (Silesia) and the last 5th September (East Prussia). According to observations by Hey [see below, p. 36], *P. anomala* can develop at very high temperatures (30° C. and above) as well as at relatively low ones [cf. *R.A.M.*, x, p. 442].

Very little infection of wheat and barley by *P. glumarum* was recorded in 1930, partly owing to the high spring temperatures following the hot late summer of 1929, a parallel to which may be found in the similar conditions of 1921–2 [cf. ibid., x, p. 714]. On barley this rust seems to be almost entirely confined to the Baltic coast from the Danish-German frontier to East Prussia.

Both wheat and rye were severely attacked by brown rust (*P. triticina* and *P. secalina*) in a number of districts, infection beginning in the south-eastern and south-western provinces with a continental climate and spreading over the entire country with rising summer temperatures [cf. ibid., ix, p. 768].

A striking correlation has been observed between the incidence of black rust (*P. graminis*) and the distribution of barberry [cf. ibid., vi, pp. 83, 320]. The disease is particularly severe on late-maturing wheat and oat varieties in the Lower Alps, so much so that in Upper Bavaria the development of early varieties is one of the chief objects of cereal breeding. Rye is attacked by *P. graminis* principally in the north-eastern districts, where oats are also sometimes severely affected; on barley the disease occurs almost exclusively in south Germany.

In the south-eastern districts of East Prussia, oats have been largely replaced by barley or the two cereals are mixed, on account of damage by *P. lolii*, the high temperature optimum of which favours its development on late maturing varieties [ibid., ix, p. 770].

Raeder (J. M.) & Bever (W. M.). **Spore germination of Puccinia glumarum with notes on related species.**—*Phytopath.*, xxi, 8, pp. 767–789, 3 figs., 1931.

The optimum humidity and temperature for the retention of germinability of the uredospores of *Puccinia glumarum* were found to be 49 per cent. and 9° to 13° C., respectively. Uredo-

spores under these conditions remained viable for 88 days, the corresponding periods for two forms of *P. graminis* being 120 and 128 days, respectively. Uredospores of *P. triticina* were viable for 124 days at a temperature of 3° to 11° and a relative humidity of 49 per cent.

Transferring uredospores after all germination had ceased at 29° to 30° to temperatures of 9° to 10° for 48 hours resulted in renewed germination in all three rusts, viability being thus extended for 6 days in *P. glumarum* and for 11 and 8 days, respectively, in *P. graminis* and *P. triticina*. Similarly, when uredospores were transferred from freezing point, after germination had ceased, to room temperature (23° to 26°) for 48 hours, those of *P. glumarum* germinated for 4 days longer and those of *P. graminis* and *P. triticina* 6 days longer.

At the temperatures prevalent in an ordinary ice refrigerator the teleutospores of *P. glumarum* retained their germinability longer than at 28° to 30°. Teleutospores incubated under these conditions had apparently lost their germinability by the following spring, but were revived by various stimuli (citric, boric, hydrochloric, and other acids). A marked increase of germination was obtained by the exposure of teleutospores to a combination of high humidity and freezing temperature.

The authors' investigations do not afford sufficient evidence to explain the absence of *P. glumarum* east of the 103rd meridian in the United States, and further studies on various phases of the problem are necessary for its elucidation.

Neill (J. C.). **Effects of rusts and mildew on yield and quality of Wheat.**—*New Zealand Journ. of Agric.*, xliii, 1, pp. 44–45, 1 graph, 1931.

A brief account is given in popular terms of an experiment conducted at the Plant Research Station, Palmerston North, New Zealand, to ascertain the actual loss in yield caused in wheat by leaf and stem rusts (*Puccinia elymi* [*P. triticina*: *R.A.M.*, iv, p. 213] and *P. graminis*, respectively) and mildew [*Erysiphe graminis*] under conditions favourable to maximum attack.

Plots were sown in August, 1930, with certified seed of eight [named] varieties of wheat, and were transversely divided in half by cloth screens, one half of each plot being well dusted at weekly intervals with Alpha sublimed sulphur. Dusting was begun on 15th November, and the first traces of *P. triticina* and *E. graminis* were detected on both the dusted and undusted plots on 25th November, *P. graminis* developing later. The plots were harvested on various dates between 2nd and 19th February, according to the ripeness of each variety. The dusting was effected early in the evening. The weather was very broken during the period of the experiment, and there was an almost constant succession of high winds with a low average temperature.

The results obtained [which are tabulated and expressed graphically] showed that the dusted halves of the plots outyielded the undusted halves by from 17 to 96 per cent. by weight, the amount of the increase being directly correlated with the relative severity of the rust attack in all but one of the varieties. The estimated

incidence of *P. graminis* and *P. triticina* in the dusted plots varied from 0 to 4 and 0 to 10 per cent., respectively, and in the undusted from 3 to 80 and 5 to 95 per cent. Mildew was present in all the undusted plots, Major, Solid-straw Tuscan and, particularly, Velvet being the most severely affected, while there was only a trace in the dusted plots. The increased yield of the dusted plants was due chiefly to the greater weight of the individual grains, and only to a much less extent to any increase in the number of grains per head.

Dodoff (D. N.). Физиологически раси на кафявата ръжда по Пшеницата (**Puccinia triticina Erikss.**) въ България. [Physiological forms of leaf rust of Wheat (*Puccinia triticina* Erikss.) in Bulgaria.]—Reprinted from *Земледѣлска Мисъль* [*Agricultural Thought*], Sofia, ii, 2, 34 pp., 6 figs., 1 map, 1931. [English summary.]

This is a detailed account of the author's investigation in 1930 of wheat brown rust (*Puccinia triticina*) material collected from six widely separated localities in Bulgaria, for the purpose of determining the physiological forms of the fungus that occur in that country [*R.A.M.*, x, p. 648]. The experiments were made by means of single spore inoculations on eleven differential hosts [a list of which is given] in the greenhouse. The results [which are presented in tabular form] indicate the existence in Bulgaria of the already known forms XIII, XV, XVII, XIX, XX, XXI [ibid., ix, pp. 366, 768], and of a new form XXIV, which differs from forms XIII and XXI only in the reaction caused by it on the differential varieties Democrat C.I. 3384 and Mediterranean C.I. 3332. On the former, which is resistant to form XIII, form XXIV causes a reaction of an indeterminate character (infection type x) [ibid., ii, p. 159], in which symptoms proper to different types of infection frequently appear on the same leaf and cannot be mechanically separated. Mediterranean C.I. 3332 is resistant to form XXIV and susceptible to form XXI.

The most prevalent forms in Bulgaria appear to be XIII in the north and XX in the south. Form XXIV was found in three localities, and the remaining forms were only sporadic.

Bressman (E. N.). **Varietal resistance, physiologic specialization, and inheritance studies in bunt of Wheat.**—*Oregon Agric. Exper. Stat. Bull.* 281, 44 pp., 6 figs., 2 diags., 1 map, 1931.

This is an extended account of the author's observations in Oregon on physiologic specialization in, and varietal reaction and inheritance of resistance to wheat bunt (*Tilletia levis* and *T. tritici*) [*T. foetens* and *T. caries*], a preliminary note on which has already been published [*R.A.M.*, x, p. 372].

The ten forms of bunt differentiated on the basis of these studies, viz., six of *T. foetens* and four of *T. caries*, have been designated by the numbers I to X (the first 6 numbers being *T. foetens*) and are distinguished according to their capacity for infection on the varieties Albit, Hussar, Ridit, and Oro. Of these III and VIII predominated. Bunt collections designated as 7c

and 8*a* include other forms less readily differentiable with the varieties here used as indicators. Collection 7*c* is so slightly virulent that it is difficult to maintain. Form IX of *T. caries*, one of the most virulent used in these trials, and the only one showing slight morphological differences, was collected in an important wheat-growing section of eastern Oregon. A similar collection (71), originating in Czecho-Slovakia, was obtained from the Brooklyn Botanic Garden. Collections producing similar reactions on the differential wheat varieties to six foreign ones (from Sweden, Norway, Italy, Czecho-Slovakia (2), and New Zealand) have been found in the United States, and there is no direct evidence that the recently determined physiologic forms of bunt in the latter country are the result of introductions from abroad, though some of the more virulent ones may be. *T. foetens* is more commonly found east of the Rocky Mountains while *T. caries* predominates west of this range. The writer, however, does not attach great importance to this distribution or to the specific differences, which he considers to be outweighed by the divergences between the forms. The optimum temperature for spore germination in water differed widely (from 6° to 18° C.) in the different forms.

Turkey × Bearded Minnesota is the only variety hitherto tested that proved highly resistant to all the 94 collections of bunt used. The Martin, White Odessa, Albit, Regal, Hussar, Banner Berkeley, and Ridit varieties, reputed to be immune or resistant, were all found to be susceptible to one or more forms of the fungus. Inheritance studies showed that certain varieties, represented by White Odessa and Hussar, possess one or more factors for resistance to some forms and no such factors where other forms are involved [cf. ibid., ix, p. 515]. This fact emphasizes the need, not only of pure-line material for parents, but also of a pure form of bunt in inheritance experiments.

In connexion with a discussion of the relative merits of the different wheat varieties adapted for use in a breeding programme for bunt resistance, it is pointed out that all those of value have red kernels. White Odessa, Albit, Martin, Regal, and Banner Berkeley contain the same genetic factor for bunt resistance, while the two last-named may also have modifying factors for this character. In a breeding programme, any one of these five varieties could be used to represent the whole group. Hussar may be of more value than any of these on account of its greater resistance. Hohenheimer and Ridit should be used together with Hussar in a breeding programme to develop varieties resistant to all these forms of bunt. The 'pure line' method of selecting heads of bunt, as used by Dillon Weston [ibid., viii, p. 436] and the writer, has been found useful for obtaining virulent bunt, of which a strain that readily attacks Ridit was developed in this way.

REICHERT (I.). **A new strain of Tilletia tritici in Palestine.**—*Ann. of Appl. Biol.*, xvii, 4, pp. 720–724, 1930.

The results [which are discussed and tabulated] of three years' experiments indicated that the immunity of the Florence and Bunyip wheat varieties from bunt (*Tilletia tritici*) [*T. caries*] in

Palestine is purely local, being limited to the strain of the fungus prevalent in that country and possibly also to a Danish collection [*R.A.M.*, x, p. 302]. Both varieties were infected in Palestine by German, Dutch, and Swiss strains. The Palestine strain of *T. caries* may, therefore, be regarded as a new one.

Generally speaking, the various foreign bunt collections tested were found to maintain their virulence in Palestine under climatic conditions differing from those of the countries of origin. The Welsh collection, however, was unable to attack either the local or Welsh stocks of Florence in Palestine, though it did so in Wales.

ABRAMOFF (I. N.). Протравка семян формалином в опилках. [Disinfection of seeds with sawdust impregnated with formalin.]—*Plant Protection*, Leningrad, viii, 2, pp. 155–159, 1931.

After pointing out the unreliability of dust fungicides for the control of cereal smuts under East Siberian conditions, and the drawbacks presented by the usual method of treating the seed-grain with formalin, the author states that preliminary experiments [some details of which are given] in 1930 at the Russian Far East Plant Protection Station showed that wheat bunt [*Tilletia caries* and *T. foetens*] and oat smut [*Ustilago avenae*] can be effectively controlled by mixing the seed-grain with sawdust impregnated with formalin. In the tests pine wood sawdust, previously sifted to separate it from the coarser particles, was steeped until saturation (30 to 40 minutes) in various concentrations of formalin (from 1 in 5 to 1 in 300), and after drawing off the excess liquid was mixed with the seed-grain at the rate of 1 kg. sawdust (dry weight) to 100 kg. grain, which was then covered for two hours with tarpaulins. The grain thus treated may be either used immediately, without separating it from the sawdust, which did not appear to interfere with the working of the drills, or may be stored for later use; in the latter case, the sawdust should be separated from the grain before sowing by means of the usual grain separators or cleaners, and may be again used for further treatment. Concentrations of formalin up to 1 in 100 appeared to have a stimulating effect on the germination of wheat seed, as measured by the density of the resulting stands, but 1 in 50 reduced the density of the stand by over one quarter, and still higher concentrations inhibited germination entirely; oats were apparently more resistant, since the 1 in 50 solution only slightly affected the stand and 1 in 10 reduced it from 100 per cent. (control standard) to 31. In conclusion, the author points out the great elasticity in the use of this method, since the dosage of formalin can be varied by increasing or decreasing the amount of the sawdust added to the seed-grain, the concentration of the formalin solution, and the length of time during which the treated grain is left covered with tarpaulins.

HANOW. **Die Fortschritte der Trockenbeizung.** [The progress of dusting.]—*Nachricht. über Schädlingsbekämpf.*, vi, 3, pp. 65–74, 6 figs., 2 diags., 1931.

An account is given in popular terms of the rapid and continuous

extension in Germany of the dry method of seed disinfection, with special reference to the treatment of seed-grain with ceresan [*R.A.M.*, x, p. 512 *et passim*]. This preparation is stated to have been extensively tested in a number of foreign countries, where it has received widespread recognition and official recommendation. Some of the standard dusting apparatus are illustrated, and brief notes are also given on the sprinkling, immersion, and short disinfection processes.

Hesse (G.). **Originalsaatgut, seine Aufarbeitung und Beizung.** [Original seed, its preparation and disinfection.]—*Nachricht. über Schädlingsbekämpf.*, vi, 3, pp. 75–78, 2 diags., 1931.

In order to meet the demand for large quantities of treated seed-grain, a number of seed selection stations throughout Germany are stated to be furnished with continuously working dusting apparatus, chiefly Gross-Tillator [*R.A.M.*, x, p. 373]. The seed-grain is treated with ceresan [see preceding and next abstracts] as officially recommended for use with wheat, barley, oats, and rye.

Stocker (W.). **Genossenschaftliche Saatgutbeizung.** [Co-operative seed disinfection.]—*Nachricht. über Schädlingsbekämpf.*, vi, 3, pp. 79–83, 2 diags., 1931.

The writer briefly outlines the advantages of the co-operative method of seed-grain disinfection with ceresan [see preceding abstracts], which has given excellent results during the past two years in Saxony. The number of co-operative disinfecting apparatus in the province is estimated at 100, and that of co-operative seed-cleaning plants at 800, of which at least 90 per cent. are furnished with dusting drums.

Hey (A.). **Beiträge zur Spezialisierung des Gerstenzwergrostes Puccinia simplex Erikss. et Henn.** [Studies on the specialization of dwarf rust of Barley, *Puccinia simplex* Erikss. et Henn.]—*Arb. Biol. Reichsanst. für Land- und Forstwirtsch.*, xix, 3, pp. 227–261, 1931.

A comprehensive and fully tabulated account is given of the writer's investigations at Dahlem, Berlin, on specialization in dwarf rust of barley (*Puccinia anomala*) [see above, p. 31].

The physiological conditions governing infection by dwarf rust were found to be very similar to those obtaining in the case of the other brown rusts, viz., *P. dispersa* [*P. secalina*], *P. triticina*, and *P. coronifera* [*P. lolii*], especially the first-named. The development of *P. anomala* is most abundant at a temperature of 16° to 20° C. with a relative atmospheric humidity of 70 to 80 per cent., but it can take place up to 30° or more and also at low temperatures.

From 17 dwarf rust collections eight physiologic strains were isolated by the type of infection they produced on 10 standard species and varieties of *Hordeum* [which are listed]. Four of these forms appear to be widely distributed, while the remainder are probably of minor importance. Two of them from different parts of Germany showed a tendency to form teleutosori only on certain barley varieties. On an unnamed variety, as well as on

Breustedt's Schladener and Friedrichswerther Berg winter barley the teleutosori were produced in circular groups, while on other varieties they were formed in lines.

The results of extensive tests on the reaction to the different physiologic strains of *P. anomala* of 273 barley varieties showed that by far the greater number in the two main groups, *H. polystichum* and *H. distichum*, are susceptible. The former, however, comprises some varieties which are resistant to most of the physiologic strains of the rust, e.g., Australian Recka, 4-rowed Samaria, and 6-rowed Egyptian, while the Friedrichswerther Berg and Breustedt's Schladener winter varieties remained immune from infection by three strains. In the *distichum* group resistance was shown only by a few varieties to the local physiologic forms of lesser importance. A high degree of resistance to infection by *P. anomala* was shown by the wild grasses, *H. murinum*, *H. bulbosum*, *H. jubatum*, *Elymus canadensis*, and *Aegilops* spp., as well as by some varieties of oats and rye that were tested; Heine's Kolben wheat, on the other hand, developed severe necrosis as a result of inoculation. Generally speaking, the susceptibility of the susceptible varieties was maintained throughout the range of temperatures used in the tests (minimum 8°, maximum 30°), whereas the resistant varieties reacted differently to the various physiologic strains according to the temperature. Absolute resistance, as interpreted by Gassner and Straib [ibid., ix, p. 99], was shown only by Australian Recka to seven of the strains, while 4-rowed Samaria, Lichti's Lechtaler, and Ackermann's Bavaria were each resistant to two.

WINKELMANN (A.). **Streifenkrankheit und Blattfleckenkrankheiten der Gerste.** [Stripe disease and leaf spot diseases of Barley.]—*Deutsche Landw. Presse*, lviii, 35, p. 482, 1931.

Popular notes are given on the leaf spot diseases of barley caused by *Helminthosporium teres* and *Marssonina graminicola* [*Rhynchosporium secalis*], which are stated to have been very prevalent in Germany during the past season [*R.A.M.*, vi, p. 26; viii, p. 639], and on the means of distinguishing them from stripe disease (*H. gramineum*).

HOLTON (C. S.). **Hybridization and segregation in the Oat smuts.**—*Phytopath.*, xxi, 8, pp. 835–842, 4 figs., 1931.

The writer's studies on hybridization between the two oat smuts *Ustilago avenae* and *U. levis* [*U. kolleri*] have shown that they are perfectly interfertile [*R.A.M.*, x, p. 304] and can produce smut on Anthony oats. Sporidial fusions and infection only occur with monosporidial lines of the opposite sex. The hybrids caused infection of the loose smut type.

A cross between two monosporidial lines originating from the smut spores developed from a hybrid infection produced an apparently new buff type of smut on Liberty Hull-less oats. The spores of this smut were smooth and apparently colourless, in contrast to the dark brown ones of the common oat smuts.

Segregation for sex factors in *U. avenae* and *U. kolleri* was found to be on a 2 : 2 ratio. Strong evidence is adduced in favour

of the occurrence of delayed segregation of factors for certain cultural characters in both smuts, based on the fact that monosporidial lines originating from the same segment of the promycelium often exhibit marked differences in this respect [cf. ibid., viii, p. 298].

MARSCHNER (G.). **Etwas über den Roggenstengelbrand.** [Notes on stem smut of Rye.]—*Nachricht. über Schädlingsbekämpf.*, vi, 3, pp. 93–94, 1 fig., 1931.

A popular account is given of stem smut of rye (*Urocystis occulta*), which was first observed in the Niederlausitz district of Germany in 1929 [*R.A.M.*, ix, p. 47], causing 10 to 15 per cent. infection in one stand. The seed-grain for the same field was treated the following year with ceresan, which reduced the incidence of infection to a minimum.

ESMARCH (F.). **Das Mutterkorn.** [Ergot.]—*Die Kranke Pflanze*, viii, 8, pp. 113–115, 1931.

A brief, popular account is given of the symptoms and life-history of ergot of rye (*Claviceps purpurea*) in Germany, with notes on its medicinal and toxic properties, and directions for control by collection of the sclerotia before harvest time and other cultural measures.

KREITMAIR (H.) & KÜSSNER (W.). **Über den Alkaloidgehalt von Claviceps purpurea bei Kultivierung auf künstlichem Nährboden.** [On the alkaloid content of *Claviceps purpurea* in culture on an artificial medium.]—*Biochem. Zeitschr.*, ccxxxix, 1–3, pp. 189–192, 3 figs., 1 graph, 1931.

The authors' experiments were conducted to ascertain whether *Claviceps purpurea*, when grown on an artificial medium, contains the specific alkaloids of ergot (ergotoxin and ergotinin) on which its remedial properties depend [cf. *R.A.M.*, i, p. 423 ; x, p. 375]. The medium selected consisted of 0·025 per cent. magnesium sulphate, 0·1 per cent. primary potassium phosphate, 0·5 per cent. magnesium-ammonium phosphate, 1 per cent. asparagin, 5 per cent. each of gelatine and glucose, and 10 per cent. rye meal. After two to three weeks the mycelial clusters, which had reached the size of lentils, were transferred to Kolle flasks, one series of which contained the above-mentioned solid medium, while the others were filled with a liquid medium (1 part of rye meal to 10 of water, with 1 per cent. asparagin and 5 per cent. glycerine). Three to four days after inoculation a brown mycelium developed, the structure of which was similar on both media, viz., a fairly compact hyphal network without pseudoparenchymatous stromata. This formed the dark brown *Sphacelia* stage of the fungus [ibid., viii, p. 560], but with relatively sparse conidial production.

The determination of the alkaloids was then made after washing the fungus and drying it at 37° C. Chemical tests for alkaloid reaction gave positive results. The cornutin reaction was detected by means of the blue zone developing in the residue after soda precipitation. The biological test, based on the capacity of the

active ergot alkaloids to counteract or reverse the effects of adrenalin in animals or isolated animal organs, also gave positive results.

HOPKINS (J. C. F.). **Mycological notes. Diplodia—an opponent of Maize growing.**—*Rhodesia Agric. Journ.*, xxviii, 7, pp. 651–652, 1931.

After referring to the great discouragement felt by Rhodesian growers owing to the ravages of the so-called *Diplodia* disease of maize [*D. zeae* and *Gibberella saubinetii*: *R.A.M.*, x, p. 586], the author emphasizes the fact that numerous field and laboratory tests have conclusively demonstrated that treatment of the seed with a suitable dust definitely increases the yield; further preventive measures consist in the selection of cobs free from any sign of mouldiness and well covered by the husks, and the destruction of old trash.

MAHER (C.). **Ear rots and root rots of Maize in Kenya.**—*Kenya Dept. of Agric. Bull.* 5 of 1931, 28 pp., 2 pl., 1931.

In this paper (to which a foreword is contributed by G. L. Burton) a detailed account is given of the various manifestations of the seedling blight and root, stalk, and ear rots of maize in Kenya, caused by *Fusarium* spp. and *Gibberella saubinetii* in association with poor soil conditions and other unsuitable environmental factors. Full directions are given for the control of the diseases by seed selection and treatment, coupled with sanitary measures in the field.

SIRAG-EL-DIN (A.). **The Citrus twig gum disease in Egypt.**—*Min. of Agric. Egypt. Mycol. Res. Div. (Plant Protect. Sect.). Bull.* 109, 63 pp., 17 pl. (2 col.), 2 graphs, 1931.

An account is given of the twig gum disease of citrus, which is stated to be causing considerable and increasing damage in all parts of Egypt where the climate is warm and damp and the soil fertility very high, as well as in low-lying and badly drained situations. Typical symptoms of the disease are the sudden wilting and dropping of the leaves, accompanied by withering and die-back of the twigs to a distance of 30 to 60 cm. from the tips. At the base of the dead portion the bark splits and gum is exuded in considerable quantities.

The fungus isolated from diseased material was identified by Dr. H. W. Wollenweber as *Fusarium solani* [*R.A.M.*, x, p. 450]. It was cultured on a number of standard nutrient media, of which acid potato proved the most suitable, while the optimum temperature for growth was 20° to 25°. The organism is characterized by non- to biseptate, ellipsoidal, ovoid to fusoid, or comma-shaped, hyaline microconidia, measuring 11·2 to 21·2 by 3·7 to 4·2 μ; non- to 5-septate, hyaline macroconidia, 26·3 to 36·8 by 4·4 to 6·3 μ; and terminal or intercalary, spherical, non-septate chlamydospores, 8·7 by 7·3 μ.

Inoculation experiments with *F. solani* gave positive results on orange twigs, some of which developed gumming and others wilting. Inoculation tests on different citrus varieties showed that citron

[*Citrus medica*] was the most susceptible, followed by sweet orange and mandarin, while sour orange [*C. aurantium*] and rough lemon proved resistant.

SIMMONDS (J. H.). **Cobweb or pink disease of Citrus.**—*Queensland Agric. Journ.*, xxxvi, 1, pp. 16–19, 2 pl., 1931.

In this popular account of the symptoms of cobweb or pink disease (*Corticium salmonicolor*) [*R.A.M.*, x, p. 25], which has been prevalent on citrus trees in the coastal regions of Queensland during the rainy season in recent years, the author states that under local conditions the well-known salmon-pink incrustation characteristic of the fruiting stage is less common than the cobweb appearance which the disease sometimes takes. In this, cobweb-like threads spread out over the bark of the affected branch, growth being superficial at first but later penetrating and killing the bark and woody tissue. On old lesions the cobweb formation may be indistinct, but the sterile pustule stage may appear, in which light brown or faintly pink pustules, consisting of aggregated or fused fungal threads not more than one thirty-second of an inch high burst through the bark over the affected region in longitudinal rows.

The *Necator* stage is not very common in Queensland; it takes the form of orange-red eruptions through the bark, from which irregular spore-like cells are produced, which serve to spread the disease when washed or blown on to healthy branches.

Control consists in the immediate removal of affected branches, which should be cut off at least 18 in. below the last point where the disease can be detected; the cut end and 18 in. of the branch should be tarred and the tree frequently re-examined. All diseased wood should be burnt. If the disease has unwisely been allowed to reach the spore-bearing stage, the branches should be sprayed during the wet season with 6-4-40 Bordeaux mixture with resin.

KENDALL (T. A.). **Soil aeration used in treatment for Oak root fungus.**—*Monthly Bull. Dept. of Agric. California*, xx, 2, pp. 165–166, 1931.

Several citrus trees near Rivera, California, were found, in March, 1929, to be severely attacked by *Armillaria mellea* [*R.A.M.*, ix, p. 303], the main roots being infected, and the foliage turning yellow and falling. The diseased individuals were situated round a badly infected pear [ibid., ix, p. 331 *et passim*], which was removed a fortnight after thorough gassing with carbon bisulphide (1 to 1½ oz. placed in holes 1½ ft. deep). The root systems of the citrus trees were then uncovered for a radius of about 2 ft. from the trunk and 2 ft. down the tap-roots. The roots girdled by the fungus were removed, and the infected bark cut away from the less severely attacked roots for at least six inches beyond the last visible mycelium. Dehydrated lime was applied to the soil as a drying agent at the rate of 15 lb. per tree, and the uncovered trunk and tap-roots were kept as dry as possible. Only one of the roots examined in 1930 showed live mycelium. The total cost of the initial treatment is estimated at $3·17 per tree and that of the final inspection at $1 per tree.

Copeland (E. B.). **The Coconut. Third Edition, revised.**— xviii + 233 pp., 22 pl., 1 plan, London, Macmillan & Co., 1931.

In Chapter III of this book, dealing with the diseases and pests of coco-nuts (pp. 34–116), some attempt has been made to bring the information on this subject up to date, but the descriptions in most cases are brief and the literature references scanty. Most space is given to bud rot, one form of which is considered to be absolutely demonstrated to be due to *Bacillus coli*, while another is tentatively attributed to *Phytophthora palmivora*. Little reference is made to the obscure wilts of the palm that have recently attracted so much notice in the West Indies [*R.A.M.*, x, p. 452].

Mayne (W. W.). **Observations on spraying experiments.**— *Planters' Chron.*, pp. 315–317, 1931.

In May, 1930, a comprehensive series of experiments was undertaken at the Coffee Experiment Station, in Mysore, India, to ascertain the relative effects of various spray mixtures [used chiefly against *Hemileia vastatrix*: *R.A.M.*, x, p. 239] on the coffee plant. The unit taken on which to base the observations consisted in a crop-bearing branch of 14 to 18 joints, with its side shoots, and records were made of the number of shoots, adult leaves, and diseased leaves on the branch. The following figures were obtained for the number of leaves per growing shoot of each branch system treated: linseed Bordeaux mixture (10 oz. linseed) $6{\cdot}35 \pm 0{\cdot}21$; casein Bordeaux mixture, $5{\cdot}9 \pm 0{\cdot}18$; resin soda Bordeaux mixture $5{\cdot}5 \pm 0{\cdot}16$; alum Bordeaux mixture $5{\cdot}38 \pm 0{\cdot}24$; resin soda Burgundy mixture $4{\cdot}87 \pm 0{\cdot}18$; 3 per cent. solbar $3{\cdot}1 \pm 0{\cdot}11$. The corresponding figures for the unsprayed control were $2{\cdot}4 \pm 0{\cdot}13$.

Jaczewski (A. A.). Болезни Хлопчатника. [Cotton diseases.]— *Bull. of Appl. Bot., Genetics, and Plant-Breeding*, Leningrad, xxiv, 5, pp. 3–294, 26 figs., 1931.

After a brief but comprehensive review of the Russian and foreign literature dealing with the diseases of cotton up to the end of 1929 [the bibliography of which, at the end of the volume, comprises over 300 titles], the author gives considerable details of the phytopathological investigations carried out under his supervision in 1929 and 1930 in the cotton plantations in Russian Central Asia and the plantations recently established in Azerbaidjan, the government of Astrakhan, and North Caucasus. The chief diseases which threaten the cotton industry in those areas are stated to be bacteriosis, wilt, root rots, and boll and lint rots. Besides *Bacterium malvacearum* [*R.A.M.*, x, p. 595], which is widespread in all the regions surveyed, the investigations confirmed the occurrence in them of *Bact. erivanse* and *Bact. löhnisi* [ibid., v, p. 161], and it appears probable that other strains of bacteria will be found to be implicated in certain local forms of bacteriosis. Wilt was found to be caused mainly by a strain of *Fusarium vasinfectum* which does not produce a lilac odour in pure culture on rice or milk, and is considered to be Wollenweber's var. *inodoratum*, though a strain giving this smell was occasionally isolated from cotton in Daghestan. In some localities wilt was also found to be associated with *Verticillium albo-atrum* [cf. ibid., ix, p. 380]. In general, *Fusarium*

wilt is more prevalent in the areas with a hotter climate, while the *Verticillium* wilt develops chiefly under more temperate conditions. The causes of the cotton root rots investigated have not yet been definitely established; although *Ozonium omnivorum* [*Phymatotrichum omnivorum*: ibid., x, p. 662] is fairly widespread in the soil, it has not yet been found attacking the cotton plant. A considerable portion of the book is dedicated to the organisms which were isolated from cotton boll and lint rots, some preliminary information on which has already been noticed from a previous paper [ibid., ix, p. 307]. Among others, *Nematospora gossypii* [ibid., x, p. 519] is stated to have been isolated from cotton fibres from Fergana.

Naoumoff (N. A.). Результаты работ по изучению грибных болезней саранчи—**Schistocerca gregaria.** в Средней Азии летом **1929** г. [Results of the investigation of the fungal diseases of locusts (*Schistocerca gregaria*) in Central Asia during the summer of 1929.]—*Materials for Mycol. and Phytopath.*, Leningrad, viii, 2, pp. 115–124, 1931.

The investigation of the high mortality which was observed during the summer of 1929 among the migratory and local population of locusts (*Schistocerca gregaria*) in Russian Central Asia showed definitely that it was not caused by parasitic fungi, but was either due to the activity of a parasitic fly, the larvae of which were invariably present in all the dead individuals (both in the larval and instar stages) and in most of the living ones that were examined, or to the use of poisoned bait which was broadcast during the spring. Both the living and dead locusts were found to carry a copious fungal flora, e.g., two species of *Fusarium*, one of *Mucor*, and various representatives of *Aspergillus* (*A. niger* group), *Alternaria*, *Cladosporium*, *Helminthosporium*, and others, but in no case was the mycelium of any of these organisms found in the internal tissues or cavities of the insects, and none was capable of penetrating the living or dead tissues even under optimum conditions, but only grew and sporulated on the surface.

Mason (F. A.). **Entomogenous fungi from a Derbyshire cave: Stilbella kervillei Lindau, newly recorded in Britain.**—*Journ. of Botany*, lxix, 824, pp. 205–207, 1931.

Dead flies (probably *Blepharoptera serrata* or a nearly allied species) were found in a cave at Cresswell, Derbyshire, bearing the fructifications of an entomogenous fungus identified by Petch as *Stilbella kervillei* (Quél.) Lindau, as well as the immature conidial (*Hymenostilbe*) hair-like filaments of a *Cordyceps*. *S. kervillei* (an emended diagnosis of which is given by Petch) is characterized by synnemata up to 5 mm. in height, terminating in yellow, waxy heads, 0·4 mm. in height and 0·36 μ broad, white, tomentose stalks, branched conidiophores, 20 by 1 μ, and hyaline, catenulate conidia of two types, either oval, measuring 1·5 to 2·5 by 0·75 to 1 μ, or globose, 1·5 μ in diameter. The brown, smooth, subglobose spore-like bodies borne at the apices of short, lateral hyphae arising from the thin crust of mycelium covering the insect measure

5 to 7 by 3 to 5 μ, while the dimensions of the smooth, brown, citriform bodies similarly produced are 7 to 12 by 5 to 7 μ.

REDAELLI (P.). **Tecnica micologica medica.** [A technique of medical mycology.]—227 pp., 58 figs., Bologna, L. Cappelli, [1931].

In this work the author gives very detailed instructions for the isolation and study of human and animal pathogenic fungi considered under the following six headings: summarized notes on the morphology and general biology of fungi pathogenic to man and animals; notes on the modern classification of these fungi; special diagnostic technique for separate groups of fungi; pathogenesis and general pathological anatomy; and principal culture media. The book is copiously illustrated, and contains a full bibliography of the subject.

HUFSCHMITT (G.), SARTORY (A.), SARTORY (R.), & MEYER (J.). **Un cas de blastomycose cutanée à foyers multiples.** [A case of cutaneous blastomycosis with multiple foci.]—*Ann. de Dermatol.*, Sér. VII, ii, 8, pp. 850–876, 11 figs., 1931.

In connexion with a general discussion on the diagnosis of human blastomycosis, the writers give a full account of a case of this disease in Haut-Rhin, France. The fungus isolated from the pus of lesions on various parts of the body was characterized by budding, yeast-like forms measuring 2·5 to 3 by 3·5 to 4 μ, asci 4 to 12 μ in diameter, and ascospores measuring 2 to 3 μ. The formation of ascospores is associated with the presence of a bacterium in the condensation liquid of solid media, and further occurs on Gorodkowa's medium and plaster blocks. The optimum temperature for the development of the fungus, which was highly pathogenic to mice and slightly so to guinea-pigs, ranged from 27° to 35°, with a minimum below 5° and maximum between 37° and 42°. Glucose and saccharose were fermented. The organism is named *Debaryomyces mucosus* n. sp., its relationships with *D. hudeloi* [*R.A.M.*, viii, p. 103] and Ota's species being shown by means of a table.

NEGRONI (P.). **Datos estadísticos de 157 casos de micosis humanas estudiados en la ciudad de Buenos Aires. Algunas consideraciones de órden médico.** [Statistical data of 157 cases of human mycosis investigated in the city of Buenos Aires. Some reflections of a medical nature.]—*Folia Biol.*, *1931*, 3–4, pp. 15–18, 1931. [French summary.]

Among the 157 cases of human mycosis investigated in Buenos Aires, the genus *Trichophyton* was represented by 12 species [which are enumerated with the infection percentages and brief clinical details], *Microsporon* by 2, *Epidermophyton* by 3, *Achorion* by 2, *Cryptococcus* by 1 [unidentified], and *Actinomyces* by 2. Other records included pityriasis versicolor due to *Malassezia furfur* [*R.A.M.*, x, p. 312], American blastomycosis (*Coccidioides immitis* and *Mycoderma* [*Blastomyces*] *dermatitidis*) [ibid., vii, pp. 578, 719; ix, p. 652; x, p. 520], and aspergillosis (*Aspergillus fumigatus*).

FUJII (S.). **Über Pompholyx und pompholyxartige Erkrankungen.** [On pompholyx and pompholyx-like diseases.]—*Japanese Journ. of Dermatology*, xxxi, 7, pp. 959–983, 15 figs., 4 graphs, 1931. [Japanese, with German summary on pp. 71–72.]

During the year 1930 the writer invested 240 cases of pompholyx of the feet or, less often, of the hands in and near Tokyo. Twenty-seven strains of *Trichophyton purpureum*, 11 of *T. interdigitale* [*T. mentagrophytes*], and 1 of *T. glabrum* were isolated from the lesions [*R.A.M.*, x, p. 596]. On the feet the fungi under discussion behaved as true parasites, whereas on the hands the lesions were semi-parasitic and semi-idiopathic. The secondary or transitional phase of the disease (trichophytid) was found exclusively on the hands [cf. ibid., x, pp. 313, 522].

KUROTCHKIN (T. J.) & CHEN (F. K.). **Mycological study of tinea of the glabrous skin.**—*Nat. Med. Journ. of China*, xvii, 4–5, pp. 521–528, 6 pl., 1 fig., 1931.

The results of the mycological examination of 100 cases of various mycoses of the glabrous skin conducted at the Peiping Union Medical College clearly indicated that the primary etiological agent was a fungus of the *Epidermophyton* [*Trichophyton*] *rubrum* type [*R.A.M.*, x, pp. 243, 730]. The species generally known as *E. salmoneum*, *E. interdigitale*, *T. purpureum*, *T. rubidum*, and *T. pedis* are regarded by the writers as synonymous with *T. rubrum*. *E. inguinale* [*E. floccosum*: ibid., x, p. 243] was isolated from tinea of the feet in 6 out of 36 cases, but was never found to be associated with tinea cruris, of which it is practically the sole cause in Europe. *T. violaceum* and *Microsporon ferrugineum* [ibid., x, p. 664] were each isolated from four cases of tinea of the body.

KUROTCHKIN (T. J.) & CH'IN (T. L.). **Tinea of nails in Peiping.**—*Nat. Med. Journ. of China*, xvii, 4–5, pp. 534–540, 6 pl., 1931.

Epidermophyton [*Trichophyton*] *rubrum* [see preceding abstract] was isolated from nine out of thirteen cases of onychomycosis at Peiping, and was also responsible for two cases of leuconychia. Onychomycosis was found to be a secondary infection, apparently from cutaneous mycotic lesions in most of the cases examined.

CHEN (F. K.), KUROTCHKIN (T. J.), & HU (C. K.). **Tinea favosa in Peiping.**—*Nat. Med. Journ. of China*, xvii, 4–5, pp. 529–533, 4 pl., 1 fig., 1931.

From 18 out of 410 cases of tinea of the scalp among orphanage children at Peiping, the authors isolated a strain of *Achorion schoenleini* [*R.A.M.*, x, p. 664] differing in certain cultural characters from the type species. The colonies were buff-coloured with a glabrous surface or white and covered with a very short duvet; radial rays were formed in the profuse submerged growth and occasionally also on the surface. The fungus is believed to be a new variety [unnamed] of *A. schoenleini*.

Parish (H. J.) & Craddock (S.). **A ringworm epizootic in mice.** —*Brit. Journ. Exper. Path.*, xii 4, pp. 209–212, 1931.

Details are given of an epizootic of ringworm (*Trichophyton gypseum asteroides*) [*T. mentagrophytes*: *R.A.M.*, x, p. 243] affecting over 1,000 of the entire stock of 2,500 mice at the Wellcome Physiological Research Laboratories, Beckenham, Kent. Laboratory attendants who came into daily contact with the diseased animals became infected and a similar infection was found in two horses belonging to the Laboratory.

Agostini [Angela]. **Coniosporium isolé d'un cas d'onychomycose.** [A *Coniosporium* isolated from a case of onychomycosis.]—*Boll. Sez. Ital. della Soc. Internaz. Microbiol.*, iii, 6, pp. 209–211, 1931.

From an infection of the nails of the hands and feet of an Italian male patient aged 27 years the author isolated a new species of *Coniosporium* which she names *C. onicophylum* Agostini but without a technical diagnosis.

Parievskaya (Mme A. P.). **Мокрая или белая гниль на Льне, вызываемая грибом Sclerotinia libertiana Fuckel.** [Wet or white rot of Flax caused by the fungus *Sclerotinia libertiana* Fuckel.]—*Materials for Mycol. and Phytopath.*, Leningrad, viii, 2, pp. 165–170, 6 figs., 1931.

A brief account is given of a severe outbreak of a white rot of flax stems caused by *Sclerotinia libertiana* [*S. sclerotiorum*], similar to that described from Ireland [*R.A.M.*, ii, p. 118], which was observed in 1929 both in experimental plots and in the peasants' fields in the government of Moscow, this being stated to be the first record of the disease in that region. A new feature of the outbreak was the discovery of fruiting apothecia of *S. sclerotiorum* in the fields: these are described as flat, cinnamon-brown bodies borne on cylindrical stipes tapering downwards. The asci are hyaline, cylindrical, 152·9 to 199·4 by 4·3 to 12·4 μ, intermixed with slender paraphyses. The asci contain eight hyaline, ellipsoidal spores, 9·8 to 16·8 by 4·2 to 8·4 μ in diameter. In the field the mycelium of the fungus was very frequently found passing from cruciferous weeds to flax stems in contact with them, this showing the importance of keeping flax fields clear of weeds. In certain localities the percentage of infection was as high as 42, the consequent reduction in the crop being very considerable.

Natalyina (Mme O.). **Предварительное сообщение о болезни Льна, вызываемой грибком Phlyctaena linicola S. и обнаруженной на Дальнем Востоке летом 1930 года.** [Preliminary report on a Flax disease caused by *Phlyctaena linicola* S., found in the Far East during the summer of 1930.]—*Plant Protection*, Leningrad, viii, 2, pp. 177–183, 3 figs., 1931.

This is a brief account of a disease which was found in 1930 on the grounds of the Nikolsk-Ussuriisk Plant Protection Station attacking flax plants of a variety labelled 'African flax No. 182 with large fruits' which was imported from North Caucasus, but which is believed, on the ground of its botanical characters, to

have originally come from Argentina. The disease corresponded closely to the 'pasmo' disease (*Phlyctaena linicola*) described from America [*R.A.M.*, x, p. 364] both in its symptoms on the host and in the morphological details (save for some minor differences) of the causal organism; a culture of the latter has been sent to Brentzel for final identification. Investigations in the same year showed that the disease was also present on the same variety of flax at the Vladivostock Plant Breeding Institute, where, owing to the favourable climatic conditions, it had already passed to other varieties of flax growing near by. In both localities the disease was causing considerable damage to the foliage and stems, and the importance of taking immediate steps to prevent any further importations of the fungus, hitherto unknown in eastern Asiatic Russia, is emphasized. Preliminary artificial inoculation experiments failed to give positive results, apparently owing to defective technique and to the difficulties which were experienced in inducing the organism to grow in pure culture.

Ocfemia (G. O.). **Save the Abacá industry from ruin by bunchy-top.**—*Philipp. Agric.*, xx, 3, pp. 167–169, 1931.

The urgent necessity of strict precautions to prevent the further spread of bunchy top of abacá or Manila hemp [*Musa textilis*] in the Philippines is emphasized [*R.A.M.*, ix, p. 785 and next abstract]. The movement of all abacá and banana plants and their near relatives from infected areas to other hemp-growing centres should be prohibited, while a further danger lies in the transference from one place to another of infested soil which may harbour the aphid *Pentalonia nigronervosa*, known to be concerned in the transmission of the disease. Plant materials and other perishable products from the infected areas should not be wrapped in banana leaf sheaths or abacá and banana leaves for shipment to healthy districts, since the insect may be carried on these parts, as well as on the roots and corms. When an outbreak of bunchy top occurs, the entire stools showing symptoms of infection should be eradicated, chopped to pieces *in situ*, and thoroughly sprayed with black leaf 40 or tobacco decoction to kill the infected aphids, the corms being burnt to prevent production of diseased sprouts. Plants to be used in the re-establishment of the abacá industry in the devastated areas should be grown from seed suckers obtained from absolutely healthy districts.

Calinisan (M. R.). **The occurrence of bunchy-top and root-knot in Abacá.**—*Philipp. Journ. of Agric.*, ii, 2, pp. 121–127, 3 pl., 1931.

Bunchy top and root knot of abacá [*Musa textilis*] are stated to be frequently prevalent together in the Philippines [see preceding abstract], so that at first sight it may be difficult to distinguish between the two diseases. However, an examination of the roots of 27 of the abacá seedlings affected by bunchy top showed no trace of invasion by nematodes. Bunchy top may generally be recognized by the stunted and bunchy growth of the plants, the leaves of which are chlorotic and almost bladeless. In the case of root knot, galls are always present on the roots, the diseased plants

sometimes being stunted, with pale leaves, but not necessarily bunchy.

RODIGIN (M. N.) & PAPAEVA (NINA A.). Корневой рак плодовых деревьев в Нижнем Поволжьи. [Crown gall of fruit trees in the Lower Volga basin.]—*Plant Protection*, Leningrad, vii, 1–3, pp. 113–119, 1931.

Crown gall [*Bacterium tumefaciens*] is stated to have been first recorded in the Lower Volga basin in 1927, almost exclusively on some young pear trees supplied by an important local nursery in Balashoff, where there is evidence that the organism was already present in 1925. As no measures were taken for its control, the disease rapidly gained ground until in 1928 nearly 30 per cent. of the pear and apple planting material reared in this nursery was shown to be infected, with a consequent wide diffusion of crown gall on these hosts throughout the basin. This led to experiments at the nursery for the purpose of eliciting the relative susceptibility of apple varieties [42 of which were tested] to the disease, the results in 1928 and 1929 indicating the existence of wide differences in them in this respect. Thus, ten varieties (including English Pippin and Steinkerke) gave indications of complete resistance under the conditions of the tests, and three (Baboushkino, Skrijapel, and Koritchnevoye Polossatoye [Brown Striped]) showed not more than 1 per cent. infection, while in the remainder infection was more frequent, reaching 30 per cent. in Red Anise. As a general rule, all the resistant varieties are characterized by the high acidity of their sap. The nature of the scion, in these experiments, appeared to have a decisive influence on the resistance or susceptibility of the grafted trees (all of which were worked on the same, relatively susceptible Kitayka stock), the reaction of which to infection was the same as that of the respective scions alone.

The preliminary results of further experiments [very brief details of which are given] indicated that healthy apple cuttings planted close to infected ones could develop typical crown galls in five months. The causal organism is capable of extension inside the host tissues, causing the formation of secondary tumours; infection apparently only takes place through cuts or wounds in the root system. The surgical removal of the galls and subsequent disinfection of the roots with 1 in 1,000 mercuric chloride, 1 in 300 formalin, or 1 per cent. copper sulphate solution did not give practical control. One- and two-year-old trees infected with *Bact. tumefaciens* usually develop as vigorously as uninfected ones, and occasionally show signs of stimulation of growth, but this is not maintained in the following years, and a large proportion of them die before the sixth year.

HARRIS (R. V.). **The crown-gall disease of nursery stocks. II. The relative susceptibility of Apple stocks to crown-gall. A progress report.**—*Ann. Rept. East Malling Res. Stat. 1928, 1929 and 1930, II Supplement*, pp. 140–142, 2 pl., 1931.

An account is given of experiments begun at East Malling in 1929 in the investigation of crown gall of apple stocks (*Bacterium*

tumefaciens) [*R.A.M.*, iv, p. 221] to determine the relative inherent susceptibility of stocks of the types available at East Malling [ibid., iv, p. 354] by inoculating them with pure cultures of the organism under controlled conditions. Stock no. VII was markedly more susceptible than stock no. I, in regard both to the relative number of successful inoculations and the size of the resultant galls.

JOHNSTONE (K. H.). **Observations on the varietal resistance of the Apple to scab (Venturia inaequalis, Aderh.) with special reference to its physiological aspects.**—*Journ. Pomol. and Hort. Science*, ix, 1, pp. 30–52, 4 pl., 1 diag., 1 graph, 1931.

A full account is given of researches carried out at Long Ashton from 1927 to 1929 on the environmental conditions favouring attack by the apple scab fungus (*Venturia inaequalis*) on different varieties of apple, as well as on the effect of the host on the parasite at the time of penetration and during the subsequent growth of the fungus.

Desiccation, following inadequate wetting, both in the field and under laboratory conditions considerably reduced the germinative power of the spores, this effect being modified, under laboratory conditions, by the nature of the surface on which the spore suspension was placed. Wetting of the organs of the host is modified by varietal peculiarities; protective hairs are present in some young leaves, fruits, and twigs, while a few varieties have water-retaining hairs. Hairs do not appear to determine varietal resistance to *V. inaequalis*, but have a supplementary importance in this respect.

The viability of the spores was affected by the substratum of the lesion producing the spore, by the age of the lesion or culture, the desiccation of the lesion, and by prolonged sub-culturing. The highest germination was obtained from spores found in young lesions on young leaves. Conidia taken from fruits gave poor germination, while those obtained from apparently fresh lesions towards autumn were almost inviable. Spores sown in water from lesions of approximately the same age on leaves of Sweet Alford, Cap of Liberty, an unnamed Cider apple, and the Court Royal varieties, gave, respectively, 90·52, 84·89, 95·21, and 82·7 per cent. germination. The best germination was observed with spores which had just reached maturity. Desiccation appeared to hasten loss of viability; malt agar cultures kept in desiccators for four days gave an average of 47·28 per cent. germination, against 64·99 to 74·01 per cent. in the controls, even though the agar had not completely dried out, while spores from a leaf placed in a desiccator for 24 hours showed a germination reduction from 95·76 to 72·93 per cent. Prolonged sub-culturing not only reduced the number of conidia formed but led to the development of irregularly shaped spores, somewhat resembling the *Cladosporium* type, or even an irregular breaking up of portions of mycelium [*R.A.M.*, x, p. 465].

Evidence was obtained that conidia after culturing showed reduced virulence, and also that different strains may differ in virulence. Some of the strains used appeared to affect certain varieties more than others. It was also found that the organs of

Sinriki rice were sown on the sand in each flask. Measurements of the weights, heights, and length and number of roots of the seedlings showed that the filtrates from the cultures of *A. niger*, *A. parasiticus*, and *A. tamarii* were antagonistic to and weakened the pathogenicity of all three rice organisms; they were, moreover, somewhat toxic to the seedlings themselves.

When seedlings were inoculated at the ligule of the leaf sheath with a sclerotium of *C. sasakii* and the treated portion covered with a piece of cotton moistened either with water only, culture solution only, culture filtrate of *A. niger*, of *A. parasiticus*, or of *A. tamarii*, 41, 44, 23, 18, and 25 plants, respectively, became diseased out of 50 plants for each treatment while the number of lesions formed was 93, 125, 27, 27, and 47, respectively. This result proves that the culture filtrates weakened the pathogenicity of *C. sasakii* on the stems of rice plants, and in this case were not toxic to the host.

Endô (S.). **On the influence of hydrogen-ion concentration on the mycelial growth of the causal fungi of Sclerotium diseases of the Rice plants.**—*Bull. Miyazaki Coll. Agric. For.* 8, pp. 1–11, 1935. [Japanese, with English summary.]

The minimum, maximum, and optimum P_H values for the growth of *Hypochnus* [*Corticium*] *sasakii* [*R.A.M.*, xiv, p. 120 and preceding abstracts] were, respectively, 2·507, 7·759, and from 5·437 to 6·667, for *Sclerotium oryzae-sativae* they were 2·674, 8·262, and between 4·172 and 7·414, for the *Sclerotium* referred to as 'Sakurai's No. 2' [ibid., xi, p. 539] they were 2·672, 8·522, and 5·991 to 6·13, for *S.* 'Sakurai's No. 3' [loc. cit.] they were 3·201, 9·01, and 5·073 to 5·939, for the 'Haiirokinkaku' fungus (*S.* sp.) they were 2·699, 8·73, and 5·506 to 5·749, and for *S. japonicum* Endô & Hidaka 2·699, 9·01, and 5·004 to 6·165.

Murray (R. K. S.). **Oidium leaf disease in Ceylon in 1935.**—*Quart. Circ. Rubb. Res. Scheme*, xii, 1–2, pp. 1–9, 1935.

During 1935, when the season was abnormally dry, *Oidium* leaf disease of *Hevea* rubber [*O. heveae: R.A.M.*, xiv, p. 654] was very severe in Ceylon at high altitudes as well as in those mid-country areas where the trees wintered late; in both localities there is urgent need for sulphur dusting to be continued. In the low-lying districts the incidence of the disease, slight at first, rose rapidly with the advent of the rains in mid-February, and late-wintering trees suffered seriously; in these areas the disease is likely to remain of considerable consequence.

Experimental areas dusted and manured, dusted only, manured only, and untreated showed, respectively, 88, 92, 19, and 35 per cent. of the trees with healthy leaves and 1, 1, 34, and 24 per cent., respectively, of the trees appreciably defoliated, the remainder having leaves spotted and malformed. The cost of the dusting (machines not included) was 3·54 rupees [5*s.* 3*d.*] per acre. The largeness of the leaves on the dusted trees and their almost complete freedom from spotting and distortion showed conclusively that the reduction of leaf area caused by *O. heveae* has hitherto been altogether underestimated.

As severely affected areas show great reduction of seed, and as the

pods act as the chief centres of infection by the *Phytophthora* [*P. palmivora*: ibid., xiii, p. 593], causing secondary leaf fall, the greater the incidence of *O. heveae* the less the likelihood of later infection by *P. palmivora*, and vice versa. On some low-country estates the control of *O. heveae* was so complete in 1935 that there was a sharp attack by *P. palmivora* in June and early July. Observations on the effect of the *Phytophthora* in dusted areas indicated that the advisability of dusting the areas more lightly affected by mildew is open to question, but in wet low-country areas, while dusting need not be discontinued, the safest course is to compromise, allowing *O. heveae* to attack the flowers, but preventing most of the foliage injury. The author suggests that for these areas, but not at high elevations or in districts where a wet monsoon is not experienced, the quantity of sulphur used should be reduced by a third, to about 4 lb. per acre per application.

Murray (R. K. S.). **The control of Oidium.**—*Quart. Circ. Rubb. Res. Scheme*, xii, 1–2, pp. 10–17, 1935.

In this lecture given to the Matale Planters' Association on 17th April, 1935, the author, discussing the conclusions to be drawn from the season's sulphur dusting of *Hevea* rubber against *Oidium* [*heveae*: see preceding abstract] in Ceylon, states that in the absence of control there is little likelihood that the disease will revert to its former unimportance. The improvement in foliage resulting from an expenditure of 4 or 5 rupees [about 6*s.*] per acre on dusting was much greater than that given by one of 30 rupees [45*s.*] per acre on manuring. At all elevations from sea-level to 2,000 ft. dusting gave very striking control. Emphasis is laid on the urgent importance of making the first application sufficiently early and the subsequent ones at approximately weekly intervals. The quantity of sulphur required ranges from 25 lb. per acre per season in the low country to 75 lb. at high elevations. The cost of the treatment (including all charges except depreciation of the machine) varied from 3 to 9 rupees per acre. Supposing that one machine suffices for 500 acres and that its cost is written off in three years, 80 cents per acre per annum must be added to the cost of treatment, which, on a basis of a crop of 250 lb. per acre means that dusting increases the cost of production by 2 cents [a little over $\frac{1}{2}d.$] per lb. The risk of the dusting causing serious tainting of adjacent tea bushes [*R.A.M.*, xiv, p. 657] can be obviated with reasonable care, and if necessary by arranging for the dusting to be carried out immediately after the plucking of the tea.

Pieris (W. I.). **Demonstration of the control of Oidium on smallholdings in 1935.**—*Quart. Circ. Rubb. Res. Scheme*, xii, 1–2, pp. 18–24, 1935.

The beneficial effect of sulphur dusting against *Oidium* [*heveae*] on *Hevea* rubber [see preceding abstracts] was demonstrated to smallholders on plots in each of five centres in Ceylon in 1935, the treated trees, in contrast to the neighbouring untreated ones, showing an absence of leaf fall, spotting, distortion, and discoloration, a glossier foliage of a richer green, and an abundance of flower. The total cost amounted to approximately 8·5 rupees [12*s.* 9*d.*] per acre, this high

figure being due to the heavy labour costs of the experiments and the numerous dustings necessitated by uneven wintering.

CUTLER (D. W.) & CRUMP (LETTICE M.). **Problems in soil microbiology.** —vii+104 pp., 1 fig., 1 diag., 16 graphs, 1 map, London, Longmans, Green & Co., 1935.

The contents of this monograph are stated to be largely based on work carried out in the General Microbiology Department of the Rothamsted Experimental Station by the authors and their colleagues. Throughout the book an attempt is made to show that, biologically speaking, the soil is an eminently suitable home for living organisms and that, in course of ages, a population has been selected that is, on the whole, so unspecialized as to permit the inclusion within the general soil economy of almost any substance introduced either naturally or in the incidence of modern agricultural practice. The activities of each micro-organism depend on those of its fellows, and the courses of their combined lives form a highly complex problem which can only be solved by a study of the interactions between the individual components. The outcome of some steps in this direction is here summarized.

VERONA (O.). **Di due nuove specie di Torulopsis a pigmento rosso isolate dal terreno.** [On two new species of *Torulopsis* with red pigment isolated from the soil.]—*Arch. Protistenk.*, lxxxv, 2, pp. 312–318, 6 figs., 1935.

Full cultural, morphological, and physiological details are given of two new species of *Torulopsis* with red pigment [*R.A.M.*, xiv, p. 193] isolated from soil, one (*T. terrestris*) from the Volterrana district of Pisa and the other (*T. somala*) from Somaliland. The former is characterized on bean agar by isolated spherical or oval cells, 4·9 to 6·6 by 3·3 to 6·6 μ; on potato the corresponding measurements are 7 to 8·2 μ and on carrot 6·6 by 4·9 or 7 to 8·2 μ. On the first-named medium the colonies are pink, opaque, and slightly raised. Gelatine is not liquefied or milk coagulated, nitrates are not reduced or indol formed; sugars are not fermented but saccharose and maltose are inverted. Protein, asparagin, ammonium sulphate, and potassium nitrate are good sources of nitrogen. The dimensions of *T. somala* on bean agar are 8·2 to 9·9 by 2·5 to 3·3 μ, on potato 11·5 by 8·2 μ, and on carrot 8·2 by 6·6 μ. The colonies are of a vivid pink colour on bean agar. The biochemical characters of *T. somala* are generally similar to those of *T. terrestris*; acid is formed in abundance from levulose, mannose, and saccharose.

COOK (M. T.). **Root diseases of Sugar Cane in Puerto Rico. Part I. Normal structure of roots. Part II. A new parasitic fungus in the roots of Sugar Cane.**—*J. Agric. Univ. P.R.*, xix, 2, pp. 121–128, 8 pl., 1935.

After describing the normal structure of healthy sugar-cane roots, the author gives a brief account of a new parasitic fungus observed in stained sections of sugar-cane roots made from pot plants under study for another disease. A search for living material was unsuccessful.

The only outwardly visible symptom was small, reddish spots. The fungus, which was confined to the younger parts of the roots, was

present in the epidermal cells and cortex, but not in the axis-cylinder. There was no enlargement of the host cells, which were almost completely filled by a single plasmodial mass, or, occasionally, by several such masses. The plasmodium developed into either a thick-walled resting sporangium without a germ-tube but containing many spores, or into a thin-walled sporangium producing a single germ-tube, which punctured the cell walls and penetrated one to four cells, possibly more, and sometimes passed through the epidermis; branching of the germ-tube was observed only once. The spores formed were apparently emptied into the soil or another cell, those that passed into the soil presumably penetrating the epidermal cells of the same or another root. Many cases were observed of the infection of the epidermal cells.

As the life-history of the fungus was practically the same as that of *Olpidium*, except that flagella (which may have been present on living material) were not found on the spores, the author tentatively places the fungus in this genus, naming it [with a Latin diagnosis] *O. sacchari* n.sp. The sporangia measured 2·6 to 3·5 μ in diameter.

Wolcott (G. N.). **The first records of the mosaic disease of Sugar-Cane in Puerto Rico.**—*J. Agric. Univ. P.R.*, xix, 2, pp. 117–120, 1 map, 1935.

The author presents data concerning early records of mosaic disease of sugar-cane in Porto Rico [*R.A.M.*, vi, p. 581; xii, p. 327; xiii, p. 58; xiv, p. 607] obtained during his study of the insect pests of the crop. His field-notes indicated that on 26th March, 1915, a disease which he now believes was mosaic, was present at Añasco, Tahlon Pahlo, and at Colonia Pacha; while on 6th April, 1915, it occurred at Colonia Carlo Bravo. In 1916 the writer recorded it at Quebradillas, Camuy, and Aguadilla, and at three places in Filial Amar; these records show that in 1916 the disease must have existed far south of the area mapped by Stevenson (*J. Dep. Agric. P.R.*, iii, 3, 1919) and that the original focus of infection may have been, not in the hills behind Camuy, but much farther south.

Brandes (E. W.) & Matz (J.). **Recovery of the Sugar Cane plant from the mosaic disease.**—Abs. in *Facts ab. Sugar*, xxx, 11, p. 425, 1935.

In a paper presented to the Fifth Congress of the International Association of Sugar Cane Technologists by the above-mentioned writers, it is stated that a reduction in the infection of sugar-cane by mosaic has been effected in experiments by the admixture of juice from healthy tissues near the tip of the cane stalk with the virus inoculum taken from various diseased portions. The results indicate that a protective substance is generated near the tip of the stalk and that there are variations in the virulence of the virus taken from different parts of the cane.

The performance of some of the plants arising from the eyes of formerly diseased stalks suggests that mosaic may in some way be overcome. Different eyes from diseased stalks may produce either healthy or mosaic plants, and cases of apparently permanent mass recovery have been observed where an entire field was infected. The best method of mosaic control is the use of resistant varieties. Seed

selection from healthy stools, supplemented by roguing, is reliable only in regions where insect spread of the disease is rare.

There are stated to be indications that virus diseases are not as new as generally supposed, mosaic and Fiji [*R.A.M.*, xiv, p. 333], for instance, having been found in New Guinea, where sugar-cane was grown for many years without the importation of any new material likely to introduce infection.

Unamuno (L. M.). **Reliquiae Fragosoanae.** [Material left by Fragoso.] —*Bol. Soc. esp. Hist. nat.*, xxxv, 7, pp. 395–402, 1 fig., 1935.

A Latin diagnosis is given of *Septoria mexicana* G. Fragoso & L. Herrera sp. nov. ad int., forming numerous scattered, often confluent, irregular spots, 1 to 3 mm. in diameter, dark-coloured to black on the upper side, ashen-grey on the under, with a darker halo, on living leaves of willow (*Salix* sp.) from Mexico. The light brown, globose or globose-conoid pycnidia measure 70 to 107·5 μ in diameter and the hyaline, straight, flexuous, curved, or arcuate, subclaviform, uni-, rarely bi-septate, pluriguttulate pycnospores 34·5 to 88 by 4·2 to 5 μ. Brief taxonomic notes are given on ten other species of *Septoria* on willow with which the new one was compared

Grove (W. B.). **British stem- and leaf-fungi (Coelomycetes).**—xviii+ 488 pp., 31 figs., Cambridge University Press, 1935.

This is the first of two volumes dealing with the British Sphaeropsidales and Melanconiales; the work, when completed, will represent the first comprehensive account that has been attempted since Cooke's Handbook of British Fungi (1871). Cooke enumerated about 200 species; the present account will include more than 2,000. Volume I includes the Hyalosporae, Hyalodidymae, Hyalophragmiae, and Scolecosporae sections of the Sphaerioideae. The account is morphological, as cultural and pathological studies are excluded. It is based on Volume III of Saccardo's Sylloge with further consideration of the standard floras by Allescher, Diedicke, and Migula together with Traverso's Pyrenomycetae volume of Flora Italica Cryptogama. All the species described have been seen and microscopically examined unless the contrary is stated; the material studied is that preserved at Kew, the British Museum, and, for more than 3,000 specimens, in the author's herbarium. The work consists of generic keys and descriptions, and descriptions of the species in English. In such genera as *Cytospora*, *Phomopsis*, and *Septoria* 'the list of presumed species cannot be considered as anything but an interim catalogue of the known and described forms'. From field evidence, however, the author believes 'that two allied fungi growing upon two different hosts may themselves be equally different. Therefore, generally, in these pages the host will be made the supreme test.'

In the larger genera, the species are arranged on the basis of the host genera in alphabetical order, but sometimes with modifications; plurivorous species always come first; related hosts are, when convenient, kept together under their family or ordinal name as Gramineae, Coniferae. The systematic account closes with the Latin diagnosis of

24 new species, and the volume with a host index and an index of binomial names.

The whole represents a straightforward and valuable account of these difficult fungi, written in the main from the standpoint of an enthusiastic collector.

Tehon (L. R.). **A monographic rearrangement of Lophodermium.**—*Illinois biol. Monogr.*, xiii, 4, 151 pp., 5 pl., 1935.

The author has made a critical revision of the genus *Lophodermium* [*R.A.M.*, xii, p. 254] from a purely taxonomic standpoint, on the basis of which he here recognizes, with copious annotations, keys, and general explanatory observations, 25 good species (including four new, one new combination, and one new name). A new genus of the Hypodermataceae, *Dermascia*, represented by the type species *D. alpina* (Rehm) n.comb. and 13 others (one new), is created for those species differing from *Lophodermium* Chevallier in their intra-epidermal hysterothecia and from *Lophodermellina* Hoehn. and *Lophodermina* Hoehn. in the absence of a chitinized, aliform plate to the hysterothecia. The two latter genera, both published by von Höhnel without descriptions (*Ber. dtsch. bot. Ges.*, xxxv, pp. 418–419, 1917), are supplied with diagnoses; the former with intra-epidermal hysterothecia comprises nine species (one new and five new combinations), and the latter, with subcuticular hysterothecia, 24 species (two new and 20 new combinations). Finally, a list is given of 18 excluded species and of four that could not be classified in any of the above-mentioned genera, namely, *Bifusella vaccinii* (Carm.) n.comb., *Epidermella* n.g. with *E. communis* (Fr.) n.comb. and *E. laurii* (Fr.) n.comb., and *Locelliderma* n.g. with *L. ampelodesmi* (Ces.) n.comb.

A six-page bibliography and host and fungus indexes are appended.

Brundza (K.). **Indėlis Lietuvos Erysiphaceju florai.** [Contributions to the knowledge of Lithuanian Erysiphaceae.]—Reprinted from *Ž. Ū. Akad. Metraščio, Kovno, 1935*, 17 pp., 1935. [German summary.]

Continuing his studies on Lithuanian Erysiphaceae [*R.A.M.*, xiii, p. 805], the author states that the total number of species recorded for the country is 58; of the 84 plants here listed in an alphabetical index, 36 are new hosts for the powdery mildews, the prevalence of which was greatly increased by the dry weather of 1934. The perithecial dimensions of *Erysiphe cichoracearum* on opium poppy (*Papaver somniferum*) [ibid., v, p. 175] are larger (95 to 151 μ, average 120·4 μ) than those given by Jaczewski (90 to 125 μ) in his key for the determination of the powdery mildews [ibid., vii, p. 346]. Parsnips were infected by *E. umbelliferarum* [*E. polygoni* sensu Salmon] and cabbage by the *Oidium* stage of *E. communis* [*E. polygoni* sensu Salmon: ibid., x, p. 362]. The author points out that the *Pseudoidium* section of *Oidium* is characterized by short intervals between the conidiophores (48 μ) and the narrow width of the foot cell of these organs (average 6·3 μ) as compared with the corresponding dimensions in *Euoidium* (94 and 9·4 μ, respectively).

Dominik (T.). **Nowe gatunki grzybków mikroskopowych zachodniej Polski.** [New species of micromycetes from western Poland.]—*Acta Soc. Bot. Polon.*, xi, 2, pp. 239–246, 4 figs., 1934. [Received August, 1935.]

Brief Polish descriptions and Latin diagnoses are given of seven species and one variety of parasitic and saprophytic fungi considered to be new to science, which have been recently recorded from western Poland, including *Leptosphaeria trifolii alpestris* n.sp. which, on the living leaves of *Trifolium alpestre*, forms dark brown, globose perithecia about 200 μ in diameter; the asci are clavate, slightly rounded at the apex, with a short pedicel, and 45 to 60 by 10 to 12 μ; the paraphyses are filiform; the ascospores (8 per ascus) are monostichous, hyaline or faintly olivaceous, slightly curved, 3- to 4-septate, and measure 18 to 21 by 4 to 5 μ. *Ascochyta trifolii alpestris* n.sp. occurs on the leaves of the same host in association with the preceding, causing rounded or irregular, white or faintly greyish-yellow spots with a narrow brown margin, about 0·5 to 1 mm. in diameter; the pycnidia are epiphyllous, slightly depressed-globose, brown, and about 180 by 120 μ; the pycnospores are fusiform, pointed at both ends, uniseptate, hyaline, straight, and 9 to 15 by 2 to 3 μ. It stands closest to *A. trifolii* [*R.A.M.*, xi, p. 654] which differs from it, however, in the larger size and rounded apices of its spores, while *A. medicaginis* [loc. cit.] differs in its larger and slightly curved spores. *Septoria wodziczkiana* n.sp. causes spots on the leaves of *Anemone nemorosa*, *Phoma bacillospora* n.sp. occurs on living branches of *Symphoricarpos racemosus* in association with *Hendersonia fiedleri* var. *symphoricarpi* Cooke, and *Volutella fusariispora* n.sp. on living leaves of *Convallaria majalis* on spots with *Puccinia smilacearum-digraphidis* Kleb.

Gutner (L. S.). Материалы к монографии рода **Cytospora.** [Contribution to a monograph of the genus *Cytospora*.]—*Acta Inst. bot. Acad. Sci. URSS*, Ser. II (*Plantae Cryptogamae*) *1935*, 2, pp. 411–484, 66 figs., 1935. [German summary.]

This paper represents an attempt at a critical revision of the genus *Cytospora*, undertaken partly because of the considerable confusion which exists in the genus, and partly on account of the apparently increasing economic importance of certain of its species. The author, who chiefly used material from various herbaria, divides the genus into two subgenera, namely, *Eucytospora* (with a perfect stage belonging to the subgenus *Euvalsa* of the genus *Valsa*), and *Leucocytospora* (with perfect stages referable either to *Leucostoma* [cf. *R.A.M.*, xi, p. 60] or *Valsella*), differing from the former in that its stroma is separated from the substratum by a basal layer [black line]. Brief Russian descriptions [with Latin diagnoses for the new species] are given of 50 species of *Eucytospora*, including *C. cupressi* n.sp. ad interim on *Cupressus* spp. in the Crimea, *C. australiae* var. *foliorum* n.var. on the leaves of *Eucalyptus* sp. in the Caucasus, and *C. szembelii* n.sp. on branches of *Populus alba* in the Lower Volga basin; and of 14 species of *Leucocytospora*, including *C. sydowii* n.sp. on the branches of *Prunus* spp. in the Ukraine, differing from *C. leucostoma* and *C. prunorum* in the shape of the pustule and in

the presence of a greyish disk emerging from cracks in the bark of the host. An annotated list is further given of 33 species of *Cytospora* which were not examined by the author, and of species transferred to other genera, including *Cytophoma pulchella* n.comb. for *Cytospora pulchella* Sacc. on branches of *Fraxinus* spp., *Cytophoma syringae* n.comb. for *Cytospora syringae* Sacc. on lilac branches, and *Cytonaema thujae* n.comb. for *Cytospora thujae* Sacc. & Ell. on *Thuja orientalis*. *C. mira*, which was described in 1926 by Tschernetzkaya on dead branches of *Wistaria chinensis*, is referred to a new genus *Fusicytospora* which is created for it, under the name *F. mira*; this genus differs from *Cytospora* in its small, hyaline, continuous, and fusiform spores, measuring up to 10 by 3 μ in diameter. The paper terminates with a list of 31 species which the author considers should be discarded, and indexes of the hosts and the fungi studied.

Bondartzeff (A. S.). Трутовые грибы—**Polyporaceae** Европейской части Союза и Кавказа. [The Polyporaceae of the European part of the Soviet Union and of the Caucasus.]—*Acta Inst. bot. Acad. Sci. URRS*, Ser. II (*Plantae Cryptogamae*) [*1935*], 2, pp. 485–532, 17 figs., 1935. [German summary.]

In this paper, which is stated to be the first of a forthcoming series dealing with Polyporaceae occurring in European Russia and the Caucasus, the author gives copious notes (including morphological details) on 20 species of *Fomes* and 4 of *Ganoderma*, as well as on numerous biological forms of these species which he differentiated in the course of his investigations. Russian and Latin diagnoses are given of a new species of *Fomes*, which was found on *Lonicera tatarica* in Siberia, Russian Central Asia, and the Middle Volga basin, and is named *F. lonicerinus*; it is characterized by hoof-shaped, greyish-black or black brackets with rounded or angular reddish to greyish-brown pores. The spores are broadly ellipsoid, 3·5 to 4·5 by 3 to 3·5 μ, and the flask-shaped or conical setae 20 to 35 by 6 to 10 μ in diameter. *F. lonicerinus* agrees closely with *F. ribis* forma *lonicerae* (B. & G.), but differs from the latter in that it has setae.

The paper is supplied with identification keys and is illustrated by drawings of the spores of a number of the species; notes are also given on five doubtful species belonging to these two genera.

Naoumoff (N. A.). Определитель Мукоровых. [Keys for the determination of the Mucorales.]—140 pp., 49 figs., 1 diag., Издат. Акад. Наук СССР. [Publ. Off. Acad. Sci. U.S.S.R.], Moscow, 1935. [French summary.]

This monograph consists of a series of dichotomous keys for the determination of 337 species (including 13 new ones established by the author up to 1933) belonging to 38 genera (one new) of the Mucorales, based either on the author's studies of the organisms in pure culture or on the original descriptions of the species, where cultural material was not available. Somewhat detailed technical descriptions are given of those species and genera presenting difficulties in determination. A new feature is the division of the genera *Mucor*, *Rhizopus*, and *Mortierella* into 13, 3, and 4 sections, respectively, for which new names are sug-

gested. A full alphabetical list of all the species and their synonyms is appended at the end of the book.

Hiratsuka (N.) & Hasioka (Y.). **Uredinales collected in Formosa. IV.**—*Bot. Mag., Tokyo*, xlix, 584, pp. 520–524, 1935.

A list is given of 20 Uredinales recently collected in Formosa [cf. *R.A.M.*, xii, p. 726; xiv, p. 719] and of additional hosts for five species already recorded. *Hamaspora benguetensis* Syd. (new to Japan) was found on *Rubus pectinellus* var. *triloba* and *H. hashiokai* n.sp. on *R. lambertianus* subsp. *xanthoneurus*. The latter species [which is furnished with a Latin diagnosis] closely resembles *H. longissima* (Thüm.) Körn, especially in the teleuto stage; it is characterized by spherical, yellow to cinnamon-coloured uredosori, 0·3 to 0·6 mm. in diameter, obovate, ellipsoidal, or oblong, aculeate-echinulate uredospores, 30 to 40 by 18 to 25 μ, densely clustered, caespitose, filiform, ochraceous teleutosori, up to 3 mm. in length, cylindrical, bi- to tri-septate, smooth, hyaline or subhyaline teleutospores, 80 to 110 by 15 to 18 μ, with a long, hyaline pedicel, 12 to 18 μ in thickness. *Juniperus formosana* Hyata was observed to be infected by *Gymnosporangium corniforme* Saw., *Nephrolepis cordifolia* Pesh. by *Milesina philippensis* Syd., and loquats by *Coleopuccinia simplex* Diet. A new host of *Puccinia allii* [ibid., xiv, p. 735] was found in *Allium scorodoprasum* L. var. *viviparum* Rgl.

Ito (S.) & Tokunaga (Y.). **Notae mycologicae Asiae Orientalis I.** [Mycological notes from Eastern Asia. I.]—*Trans. Sapporo nat. Hist. Soc.*, xiv, 1, pp. 11–33, 1935.

Latin diagnoses are given of 55 species of fungi which are either new to science or have hitherto been described only in Japanese. *Pythium diclinum* Tokunaga n.sp. (*P. gracile* Schenk. var. *b.* Butler) [*R.A.M.*, x, p. 591] on rice seedlings in Hokkaido is characterized by hyaline, profusely branched hyphae, 1 to 5 μ in diameter; filiform sporangia; spherical vesicles, 18 to 40 μ in diameter, giving rise to up to 50 reniform (globose when at rest), biciliate zoospores, 7·2 to 9·6 μ in diameter; terminal or intercalary, sphaeroidal, smooth oogonia, sometimes furnished with a sharp point near the apex, 18 to 25·2 μ in diameter; one to three, mostly two, diclinous, ovoid or clavate, often curved antheridia, 6 to 12 by 3·6 to 7·2 μ, with a very slender fertilization-tube about 1 μ in diameter; and solitary, spherical or broadly ellipsoid oospores, 14·4 to 22·8 μ.

P. iwayamai S. Ito n.sp. (*P.* sp. Iwayama), a parasite of barley, wheat, and other Gramineae in Honshu, has hyaline or olive-yellow, copiously branched hyphae, 2·9 to 8·9 μ in diameter, usually 6·6 μ; terminal, spherical or irregular, smooth, pale olivaceous to yellowish sporangia 28 to 48 by 44 μ, germinating by lateral hyphae or 8 to 12 zoospores, spherical when at rest, 9 to 15 μ in diameter; intercalary, ellipsoid, pale olivaceous chlamydospores, 36 to 48 by 24 μ, androgynous or diclinous, clavate antheridia, usually occurring singly, sometimes in pairs; and spherical, olivaceous to yellow, smooth oospores, 19 to 24 μ in diameter.

Phytophthora citricola Saw. nom-seminud. [ibid., vii, p. 273; x, p. 755], forming circular spots spreading over the entire surface of orange

(*Citrus sinensis* Obs. f. *sekkan* Hayota and *C. tankan* Hyata) fruits in Formosa, is characterized by hyphae 4 to 10 μ in diameter; simple or branched conidiophores; ovoid or obclavate, papillate sporangia, 21 to 70 by 15 to 39 μ germinating by ovoid, biciliate zoospores, 13 to 8 to 9 μ, or rarely by a germ-tube; spherical, hyaline or brown oogonia, 21 to 44 μ in diameter; obovoid, paragynous or very rarely amphigynous antheridia, 12 to 13 by 8 to 10 μ; and spherical, hyaline or yellow oospores, 18 to 38 μ in diameter.

P. fagopyri Takimoto nom. seminud., producing dark brown spots on buckwheat stems in Kyushu and Korea, has hyphae, 4 to 12 μ in diameter; globose, ellipsoid or oblong-ovoid, distinctly papillate, sporangia, 35 to 45 by 24 to 35 μ, germinating by a germ-tube; hyaline, later yellowish-brown chlamydospores, 40 to 50 by 40 to 46 μ; and diclinous, paragynous, clavate antheridia. [Oospores are not mentioned in this diagnosis.]

The inter- or intra-cellular hyphae of *P. boehmeriae* Sawada nom. seminud. [loc. cit.], occurring on *Boehmeria nivea* leaves in Formosa, measure 4 to 8 μ in diameter and are furnished with haustoria; the unbranched conidia are extremely slender (15 to 16 by 2 to 3·5 μ); the ovoid to globose or oblong-ovoid, papillate, pedicellate sporangia measure 27 to 72 by 20 to 46 μ and germinate by zoospores; the spherical, hyaline or brown oogonia are 21 to 41 μ in diameter; the diclinous, amphigynous, spherical, or obovoid antheridia measure 12 to 16 by 11 to 15 μ; and the spherical, hyaline oospores, germinating by a germ-tube, are 17 to 35 μ in diameter.

P. tabaci Sawada nom. seminud. [loc. cit.] forms round, olive to brown spots on tobacco leaves and stems in Honshu. Its intercellular hyphae are 7 to 8 μ in diameter and provided with cylindrical haustoria; the ovoid, ellipsoid, or globose to ovoid, papillate sporangia measure 16 to 58 by 12 to 45 μ or up to 74 by 64 μ, and germinate by ovoid, laterally biciliate zoospores, 13 to 8 to 9 μ; the yellow to brown, spherical chlamydospores are 21 to 55 μ in diameter; the oogonia are spherical, hyaline, and 26 to 30 or rarely up to 43 μ in diameter; the amphigynous, obovoid, or spherical antheridia measure 14 to 18 by 11 to 18 μ; and the spherical, hyaline oospores are 21 to 24 or rarely 30 μ in diameter. This species is considered to be closely related to *P. parasitica* Dastur [ibid., x, p. 754], of which it may in fact be merely a biologic form [*P. parasitica* var. *nicotianae*].

P. canavaliae Hara nom. seminud. forms dark brown spots on the leaves, stems, and fruits of *Canavalia ensiformis* in Honshu. Its intercellular hyphae measure 3 to 8·8 μ in diameter and are provided with cylindrical or globose haustoria; the single or aggregated, simple or branched conidiophores measure 5 to 35 by 2·2 to 4·4 μ; the sporangia are of variable shape, mostly 55 by 25 μ, and germinate by ellipsoid, biciliate zoospores, 10 to 12 by 7 to 9 μ, or more rarely by a germ-tube; sexual reproductive organs were not observed.

Couch (J. N.). **Septobasidium in the United States.**—*J. Elisha Mitchell sci. Soc.*, li, 1, pp. 1–77, 44 pl., 1935.

A copiously annotated list is given of 36 species of *Septobasidium* found in the United States, of which *S. curtisii* [*R.A.M.*, x, p. 557] is

stated to be the most common, occurring on *Nyssa sylvatica*, ash (*Fraxinus americana*), and 26 other hosts. Next in order of frequency is *S. pseudopedicellatum* [ibid., xiii, p. 540], observed on ash, *Carpinus caroliniana*, and 21 other kinds of trees, followed by *S. sinuosum* and *S. castaneum* with 15 and 14 hosts, respectively. The total number of trees found subject to attack by *S.* spp. in the regions visited by the writer (chiefly in the southern States) was 76, insects belonging to 19 species being associated with the fungus species.

All the United States species of *Septobasidium*, with two exceptions, form basidia of eight different types, the distinguishing features of which are indicated. The life-history and morphology of the genus, as represented by nine species studied in detail, is concisely outlined. The damage caused to trees by the combination of fungus and insect may be considerable, young ash and *N. sylvatica*, for instance, sometimes being killed by *S. pseudopedicellatum* and *S. curtisii* and their symbionts, while larger trees assume an unhealthy appearance with many dead limbs. The 18 new species and one new variety described in this paper are furnished with English diagnoses and a key to the species occurring in the United States is given.

Muller (A. S.) & Chupp (C.). **Cercosporae de Minas Geraes.** [*Cercosporae* from Minas Geraes.]—*Arq. Inst. Biol. veg.*, i, 3, pp. 213–220, 1935. [English summary.]

An annotated list is given of 71 species of *Cercospora* collected by the writers in Minas Geraes, Brazil, during the past few years; the ten new species are furnished with diagnoses in Portuguese. *C. anacardii* n.sp. forms irregular, dark red lesions, 1 to 4 mm. in diameter, on the upper side of *Anacardium occidentale* and *Anona reticulata* leaves. It is characterized by fasciculate, septate, occasionally geniculate, sometimes branched conidiophores, 40 to 125 by 4 to 5 μ, bearing obclavate, usually straight, olivaceous conidia, 50 to 125 by 3 to 4 μ. *C. anonae* causes on leaves of *A. squamosa* numerous angular spots, 0·5 to 1·5 mm. in diameter, sometimes surrounded by a yellow or dark-coloured border; the densely fasciculate, non- or uni-septate, rarely branched, pale olivaceous conidiophores, 20 to 75 by 3·5 to 4·5 μ, bear mostly obclavate, pluriseptate conidia of a darker olive than the conidiophores, generally truncate at the base, tapering towards the apex (half the width of the base), 75 to 150 by 5 to 6 μ.

The genus *Ragnhildiana* Stevens & Solheim [*R.A.M.*, xi, p. 129] is rejected on the grounds that the conidial catenulation on which the genus is based is a very common and purely evanescent character, unsuitable as a taxonomic criterion; the fungus *R. manihotis* is transferred to *Cercospora* and renamed *C. caribaea* Ciferri. *C. henningsii* is also recorded on cassava. *C. vicosae* n.sp. on leaves of *Manihot* sp. is characterized by fasciculate, coremioid, geniculate, olivaceous conidiophores, 50 to 150 by 4 to 6 μ, and obclavate, olivaceous conidia, 25 to 100 by 4 to 6 μ, both conidiophores and conidia having shining septa.

Rose leaves bear on the upper side white, purple-bordered spots, 0·5 to 2 mm. in diameter, caused by *C. hyalina* n.sp., the fasciculate, non- to uni-septate, indistinctly geniculate, olive-yellow conidiophores of which, 30 to 100 by 4 to 5 μ, bear obclavate, straight or curved,

indistinctly septate conidia, slightly obtuse or truncate at the base, tapering towards the apex, 40 to 150 by 2 to 3 μ, the site of insertion on the conidiophores being marked by a scar. This host was also infected by *C. rosaecola* [ibid., xi, p. 516].

The following are among the many other records of phytopathological interest: *C. canescens* [ibid., xi, pp. 130, 431] and *C. columnae* on bean (*Phaseolus vulgaris*), *C. capsici* and *C. rigospora* on chilli (*Capsicum frutescens*) [ibid., xi, p. 605 *et passim*], *C. citrullina* on watermelon [ibid., x, p. 771], *C. cordobensis* on sweet potato, *C. oryzae* on rice, *C. solanicola* on potato, and *C. longipes* on sugar-cane [ibid., xii, pp. 39, 467].

Schmidt (M.). **Untersuchungen über das Verhalten von Tabaksorten und Nicotianaarten gegen den Erreger des 'Wildfeuers', Pseudomonas tabaci, mit Berücksichtigung züchterischer Fragen.** [Studies on the reaction of Tobacco varieties and *Nicotiana* species to the agent of 'wildfire', *Pseudomonas tabaci*, with reference to breeding problems.]—*Züchter*, vii, 3, pp. 208–215, 5 figs., 1935.

The outstanding results of inoculation experiments at the Kaiser Wilhelm Genetic Research Institute, Müncheberg, Mark Brandenburg, on 102 varieties, strains, and types of *Nicotiana tabacum* and a number of other *N.* species with *Pseudomonas* [*Bacterium*] *tabacum* have already been noticed from another source [*R.A.M.*, xiv, p. 61]. In the present expanded account the following additional information is of interest. Although every form of *N. tabacum* was more or less susceptible to wildfire there were considerable variations in the degree of involvement. A Turkish cigarette tobacco, for instance, as well as others showed marked susceptibility in the inoculation tests, and also contracted infection in the open in 1933, an exceptionally unfavourable season for the pathogen in Germany. Slight susceptibility, on the other hand, was manifested under controlled conditions by a strain of *N. tabacum* var. *macrophylla* and two local German varieties from Oderbruch and the Palatinate, the reaction being of the aberrant type [loc. cit.].

Hackbarth and v. Sengbusch have shown (*Züchter*, vii, 1, 1935) that the *petunioides* section of *Nicotiana*, to which the resistant species mainly belong, is practically devoid of nicotine, but no absolute correlation could be traced between this property and resistance to wildfire, which virulently attacked certain types with a low nicotine content, e.g., *N. silvestris* and a v. Sengbusch Havana selection 4132.

In further mass inoculation experiments by Stapp's method [*R.A.M.*, xii, p. 600], a Palatinate strain of *N. tabacum* behaved differently from the other strains in that while 294 out of 298 plants contracted virulent infection, none died. Besides *N. affinis*, *N. micrantha* displayed considerable resistance in the mass-inoculation trials, but even *N. affinis* seedlings, when inoculated at the critical stage of development, i.e., a week earlier than the comparable phase in *N. tabacum*, succumbed to infection.

The work on crossing of superior tobaccos with resistant species of *Nicotiana* and the selection of resistant hybrids approximating to the *tabacum* type presents great difficulties, since the absence of resistance within the *tabacum* section necessitates the use as parents of forms

only very distantly related either to *N. tabacum* or *N. rustica* in their chromosome numbers and chemical attributes. Alternatively, it might be feasible to develop a degree of resistance adequate for field conditions by selection and hybridization of resistant individuals.

Grooshevoy (S. E.). **Combating bacterial rust on Tobacco.**—*Табач. Пром.* [Tobacco Ind.] *1935*, 1, pp. 27–29, 1935. [Abs. in *Chem. Abstr.*, xxix, 18, p. 6354, 1935.]

For the control of bacterial rust of tobacco [*Bacterium tabacum*: *R.A.M.*, xiv, p. 659] in the U.S.S.R. the soil in infected seed beds should be steam-sterilized or heated directly at not less than 100° C., the seed treated by immersion for 15 minutes in a 0·1 per cent. solution of silver nitrate [ibid., xi, p. 77] in distilled water or in a formalin solution, 1 part (commercial) in 16, followed by washing in water, and the wooden parts of hot-beds and tools disinfected with a 1 in 25 formalin solution [see next abstract]. The young plants should be given a series of protective applications of Bordeaux mixture, beginning at 0·5 and continuing with a 1 per cent. solution, while those actually attacked by the disease must be destroyed by treatment with a 3 per cent. Bordeaux solution. Healthy young plants from infected batches should be sprayed with 1 per cent. Bordeaux mixture on transplanting.

Böning (K.). **Versuche zur Bekämpfung von Keimlingskrankheiten und Wurzelbrand des Tabaks in den Anzuchtbeeten mit chemischen Mitteln.** [Experiments in the control of seedling diseases and root rot of Tobacco in seed-beds by chemical means.]—*Z. PflKrankh.*, xlv, 8, pp. 385–415, 7 figs., 1935.

Two principal types of tobacco seedling infection by *Pythium de Baryanum* [*R.A.M.*, xiii, p. 61], *Moniliopsis aderholdi* [ibid., vii, p. 765], *Pseudomonas tabaci* [*Bacterium tabacum*: see preceding and next abstracts], and the generally less important *Thielavia* [*Thielaviopsis*] *basicola* [ibid., xiii, p. 276] were differentiated at the Munich Agricultural Institute, namely, early and late, the latter being even more destructive than the former and frequently involving the most vigorous plants in the seed bed. Early infection almost invariably proceeds direct from the soil, while that occurring at a later stage may originate either in some extraneous source (secondary) or the development of the organisms already present in the soil may have been retarded (delayed primary infection). Only secondary infection takes place in soils that have been entirely freed from the above-mentioned fungi by a powerful disinfectant, such as formalin (1·5 to 2 per cent., 10 l. per sq. m.), paraformaldehyde (30 gm. per $\frac{1}{6}$ sq. m.), ceresan (0·25 and 0·5 per cent., 10 l. per sq. m.), germisan (0·5 per cent., 6 l. per sq. m.), and uspulun (0·5 per cent., 6 l. per sq. m., or in dust form at the rate of 0·3 to 0·5 per cent., 50 to 100 gm. per sq. m.), whereas delayed primary infection results from the use of antiseptics of limited or merely temporary efficacy, e.g., Bordeaux mixture and other copper-containing preparations, quinosol [ibid., xiv, p. 9], caustic lime, and calcium cyanamide, which can only be applied at relatively low concentrations for fear of adverse effects on the growth of the stand. A third group of therapeutic preparations comprises all those exerting a stimulatory action on the

growth of the plants and thus enabling them to withstand infection, chiefly nitrogenous fertilizers applied as top-dressings. The regular admixture of calcium cyanamide with the compost heap at the rate of 100 to 200 gm. to every two or three wheelbarrow loads of soil is one of the cheapest means of preventing severe infection of the seed-bed, but where absolute freedom from disease is required the more costly process of soil sterilization with a strong antiseptic, followed by regular treatment of the seedlings with a copper-containing mixture, must be employed. For practical purposes it will generally be sufficient either to treat the soil 14 days before sowing with 1 to 2 per cent. Bordeaux mixture, some other copper-containing preparation, or quinosol, or else to spray the emergent seedlings with 0·5 to 1 per cent. Bordeaux mixture, two applications being given at a week's interval, followed in both cases by the regular spraying schedule for the later stages of growth.

Lagatu (H.) & Maume (L.). **Variations des rapports physiologiques en corrélation avec la maladie du feu sauvage chez la feuille du Tabac.** [Physiological variations correlated with the wildfire disease of Tobacco leaves.]—*C.R. Acad. Sci., Paris*, cci, 6, pp. 374–376, 1935.

The analysis of tobacco leaves in Dordogne showed that the nitrogen-phosphorus-potash content of those from healthy plants in a field free from wildfire [*Bacterium tabacum*: see preceding abstracts] was much higher than that of the foliage of diseased plants in an infested plot, whereas apparently healthy individuals in the latter presented an intermediate condition. Relatively to the healthy plants, the diseased ones had a low potash content as compared with nitrogen, a deficiency that may be partially corrected by lime but not to any appreciable extent by magnesium. Phosphoric acid was found to be much more abundant in the healthy than in the diseased or 'intermediate' plants. Excellent results in the control of wildfire are stated to have been obtained in 1932 by heavy liming and the application to the soil of potassium sulphate, basic slag, and groundnut cake at the respective rate of 400, 1,000, and 1,000 kg. per hect.

Brundza (K.). **1. Bandymai su Phytophthora infestans (Mont.) de Bary. 2. 1934 metais tyrinėtos Pamidoru ligos.** [1. Researches on *Phytophthora infestans* (Mont.) de Bary. 2. Experiments on Tomato diseases in 1934.]—Reprinted from *Rep. Pl. Prot. Sta. Dotnuva, 1934*, 16 pp., 5 figs., 1935. [English summary.]

Both potatoes and tomatoes in Lithuania are stated to suffer considerable damage every year from *Phytophthora infestans* [*R.A.M.*, xiv, pp. 391, 559], cross-inoculation experiments with which in the laboratory gave positive results on both hosts. Tomato leaves inoculated with a zoospore suspension of the fungus from either host developed conidiophores and conidia in six days.

In the dry year of 1934 *Septoria lycopersici* caused very heavy losses to tomatoes, amounting in some parts of the country to two-thirds of the crop, while *Phoma destructiva* [ibid., xiv, p. 263] and *Macrosporium* sp. were also responsible for severe injury. *Alternaria solani*, *Clado-*

sporium lycopersici, and *Aplanobacter michiganense* were also present and *C. fulvum* was abundant in greenhouses. A species of *Phoma*, with pycnidia measuring 100 μ in diameter and pycnospores 2 to 3 by 1 μ, was found after harvesting on the stakes up which the plants were trained. Four species of *Colletotrichum* were observed producing, respectively, light red, black-dotted, purple, and bluish-grey lesions on the fruit, and the spores of which usually measured, respectively, 13 to 21 by 4 to 7 μ (average 17·1 by 5·6 μ), 16 to 18 by 4 to 5 μ (17·4 by 4·6 μ), 22 to 25 by 3 μ (23·1 by 3 μ), and 23 to 26 by 3 μ (24·5 by 3 μ), the length of the setae being about 80, 180, 120, and 140 μ, respectively. Tomatoes infected by *C.* 1 showed the typical symptoms associated with this strain.

[Russell (T. A.).] **Scab spot or bacterial spotting of Tomatoes.**—*Agric. Bull. Bermuda*, xiv, 9, pp. 67–68, 1935.

In 1935, up to 50 per cent. of the tomatoes grown in different parts of Bermuda were unsaleable owing to bacterial spot (*Bacterium vesicatorium*) [*R.A.M.*, xiv, p. 681], previously present in the island only to a slight extent. The spots, especially on the Bonny Best variety, were frequently only one-twentieth of an inch in diameter. Inoculations with the bacterium obtained from diseased material gave positive results, the organism being re-isolated. Spraying with Bordeaux mixture failed to give control, some of the most heavily infected fields being those most thoroughly sprayed. Control by seed disinfection [cf. ibid., viii, p. 157; xi, p. 355] with mercuric chloride is to be attempted.

Kravtzeff (B. I.). Грибные болезни Монгольского Дуба. [Fungal diseases of the Mongolian Oak.]—*Советская Бот.* [*Sovietsk. Bot.*], Leningrad, *1935*, 2, pp. 86–98, 5 figs., 1 map, 1935.

After briefly indicating the considerable economic value of the Mongolian oak (*Quercus mongolica*) in the Amur region of the Russian Far East, where it covers an area of nearly 4,000,000 hect., the author gives a briefly annotated list of 10 species of Ascomycetes, 49 of Basidiomycetes, and 3 of Fungi Imperfecti recorded on it in that region both as parasites and saprophytes, among which the following may be mentioned. *Microsphaera alphitoides* [*M. quercina*: *R.A.M.*, xiv, p. 189] is very widespread, especially in young plantations; it occurs both in its conidial and perithecial stages, but apparently causes less injury to the host than in Europe. *Cronartium quercus* [*C. quercuum*: ibid., xiv, p. 680] is widely prevalent both on the oak and on its alternate host, the pine; it is stated that the large woody tumours caused by it on the latter are profitably used commercially because of their high content in resin and turpentine. *Hydnum erinaceus* [ibid., i, p. 443] is very common on live, and more rare on dead oaks, causing a mixed, indistinctly cylindrical, light brown heart rot, a detailed description of which is given, as well as of the rots caused by *Spongipellis* (*Polyporus*) *litschaueri* and *Phellinus* [*Fomes*] *igniarius* [cf. ibid., xiv, p. 662]. *Armillaria mellea* [ibid., xiv, p. 803] occurs practically everywhere on the living roots and stems of the oak; although the rot caused by it does not extend high up in the trunk and is not of very great economic importance, the fungus is

frequently found associated with other wood-destroying fungi, when it can be an important contributory factor in the resulting heart rot.

United States Department of Agriculture. Bureau of Entomology and Plant Quarantine. Service and regulatory announcements April–June 1935.—pp. 42–44, 1935.

A summary (dated 25th May, 1935) has been prepared concerning the plant quarantine import restrictions obtaining in Antigua, British West Indies, among which the Proclamation No. 1 of 8th March, 1935, is mentioned in detail. In order to prevent the introduction of Panama disease (*Fusarium* [*oxysporum*] *cubense*) [*R.A.M.*, xiv, p. 643] the importation of banana fruits is absolutely prohibited except from the other islands of the Leeward Islands (Anguilla, Dominica, Montserrat, Nevis, St. Kitts, and British Virgin Islands) and the United States of America, and banana plants or parts thereof may not be imported from the Bahamas, Bermuda, British Guiana, Central America, Dutch Guiana, and any place in the West Indies except under a licence granted by the Governor. Sugar-cane seedlings and plants or parts thereof may not be imported from any country except under licence, to preclude the entry of mosaic. A similar licence, together with a duly authenticated certificate of two years' freedom from citrus canker (*Bacterium* [*Pseudomonas*] *citri*) [ibid., xiv, pp. 64, 426, 544], is required for the importation of rooted citrus plants from Cuba, Haiti, Jamaica, Santo Domingo, and the United States. Further, in order to prevent the introduction of wither-tip (*Colletotrichum gloeosporioides*) [*Gloeosporium limetticolum*: see above, p. 14], a licence is requisite for the importation of lime plants and parts thereof from British Guiana, Dominica, Grenada, Montserrat, St. Kitts, St. Lucia, and Trinidad, and of lime fruits from the foregoing, the Bahamas, Bermuda, all other countries except the other islands of the West Indies not mentioned in this sentence, and the United States. Soils and plants growing in soil may not be imported from any country except under licence.

United States Department of Agriculture. Bureau of Entomology and Plant Quarantine. Plant quarantine import restrictions of the Republic of Brazil.—15 pp., 1935. [Mimeographed.]

A summary is given of the regulations dated 15th September, 1920, 21st December, 1921, and 12th April, 1934, governing the importation of plant material into Brazil [cf. *R.A.M.*, vi, p. 512]. Apart from the regulations against insect pests the importation is prohibited of banana seedlings and pseudo-bulbs to prevent the introduction of *Fusarium* [*oxysporum*] *cubense*; cacao stocks, fruits, and seeds (against *Marasmius perniciosus*); coffee stocks, berries, and seeds, and seedlings of other Rubiaceae (against *Hemileia vastatrix*); Rutaceae, including stocks, seeds, and buds of *Citrus*, *Poncirus*, *Fortunella*, *Evodia*, *Melicope*, *Casimoroa*, and *Toddalia* (against *Bacterium* [*Pseudomonas*] *citri*), and sugar-cane seedlings, cuttings, and seeds (against virus diseases). Potatoes must be accompanied by duly authenticated certificates vouching for their freedom from *Synchytrium endobioticum* and *Spongospora subterranea*, and in the case of seed from virus diseases. Cultures of bacteria and fungi injurious to plants may only be imported with the permission of the Ministry of Agriculture.

Schlumberger (O.). **Saatenanerkennung und Pflanzenschutz im Jahre 1930.** [Seed certification and plant protection in the year 1930.]—*Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, xi, 8. pp. 61–62, 1931.

During 1930 seed certification was refused in Germany on account of disease as follows: 0·8 per cent. of the total area under rye inspected (20,424 hect.) compared with 6 in 1929 [*R.A.M.*, x, p. 47]; wheat (20,804 hect.) 27·2 per cent. (30); barley (10,008 hect.) 26·1 per cent. (45·2); oats (15,884 hect.) 6·9 per cent. (12·2); potatoes (38,113 hect.) including varietal irregularities, 74·7 per cent. (62·9).

Bunt of wheat [*Tilletia caries* and *T. foetens*] was responsible for the rejection of 3 per cent. of the inspected wheat fields, compared with 2·8 in 1929; loose smut of wheat [*Ustilago tritici*] for 0·36 per cent. (0·96); covered and loose smuts of barley (combined) [*U. hordei* and *U. nuda*] for 5·5 per cent. (6·8); and loose smut of oats [*U. avenae*] for 0·6 per cent. (1·2).

Of the potato crop inspected, 3·5 per cent. was rejected for blackleg [*Bacillus phytophthorus*] compared with 5·7 in 1929; 4·2 for *Rhizoctonia* [*Corticium solani*] (2·1); 6·1 for *Phytophthora* [*infestans*] (0·7); 0·7 for the occurrence of wart disease [*Synchytrium endobioticum*] within a prescribed radius (0·8); degeneration and poverty of stand (including virus diseases) 10·9 (23·4); and miscellaneous diseases 5·2 (7).

About 23,874 doppelzentner of the total quantity of seed-grain submitted for certification was treated by the liquid method and 15,804 doppelzentner by the dry.

Montemartini (L.). **La patogenesi delle malattie delle piante.** [Pathogenesis of plant diseases.]—*Atti III° Congress. Naz. Microbiol.*, Milan, pp. 11–47, 1931.

In this paper the author discusses from many angles and with very numerous references to the relevant literature the problem of pathogenesis in plant diseases, the main points dealt with falling under the following headings: natural host defences against parasitic attack, their break-down by parasites, the active, internal defence set up by attacked organs, and the course and results of the ensuing struggle between host and parasite. The paper terminates with the author's general considerations and conclusions, and there is a 12-page bibliography. [A French version of this paper is given in *Boll. Sez. Ital. della Soc. Internaz. Microbiol.*, iii, 7–8, pp. 360–395, 1931.]

Perotti (R.). **Les myco-bactérioses.** [Myco-bacterioses.]—*Boll. Sez. Ital. della Soc. Internaz. Microbiol.*, iii, 6, pp. 209–211, 1931.

This is a version in French of a paper already noticed from another source dealing with the presence of bacteria in fungal infections of oleanders [*Nerium oleander*] and other plants [*R.A.M.*, x, p. 744].

Appel (O.). **Pflanzenschutz.** [Plant protection.]—*Wissensch. und Landwirtsch.*, pp. 15–22, 1931.

The writer gives a concise outline of the principles of plan.

protection, supplemented by data concerning the extent of the losses caused annually in Germany by plant diseases and pests [*R.A.M.*, viii, p. 455]. *Phytophthora infestans* is stated to cause a loss of 15 to 20 per cent. of the potato crop in most years, while in bad years it can reduce the crop to one-third of the normal (e.g., in 1916). The average annual loss from pests and diseases is estimated at 20 per cent. in cereals, 30 per cent. in potatoes, 15 per cent. in sugar beets, 20 per cent. in vegetables, 30 per cent. in fruit, and 40 per cent. in wine. In these crops the total yearly loss averages 18·6 per cent. Taking only 15 per cent. loss this would amount on the known value of the harvest in Germany to RM. 2,000,000,000 annually, and the author considers that it is certainly higher. Direct seasonal and weather damage is excluded from this calculation.

Smith (J. H.). **Chapter III. Virus diseases of plants.** [*ex* Volume VII of 'A system of bacteriology in relation to medicine'.]—pp. 42–53, London, H.M. Stationery Office, 1931.

This is a brief general survey of existing knowledge on the virus diseases of plants, discussed under the headings of symptoms, transmission, number and specificity of viruses, characters, and etiology.

Dale (H. H.). **Presidential address to the Physiological Section, introducing a discussion on the biological nature of the viruses.**—*Brit. Assoc. for the Advancement of Science*, Centenary Meeting, London, 1931, Section I.—Physiology, 10 pp., 1931.

This is a brief general survey of the biological nature of the viruses, in which the difficulties presented by the definition of the term 'virus' are considered, and the views of those who hold, respectively, that they are organisms, or are transmissible toxins, or belong in part to one class and in part to the other are discussed.

Storey (H. H.) & McClean (A. P. D.). **The transmission of streak disease between Maize, Sugar Cane and wild grasses.** —*Ann. of Appl. Biol.*, xvii, 4, pp. 691–719, 4 pl., 1930.

A full account, supplemented by nine tables, is given of the authors' experiments, from 1924 to 1929, on the transmission of streak disease in Natal between maize, sugar-cane, *Digitaria horizontalis*, and *Eleusine indica* [*R.A.M.*, vii, p. 439]. The leafhopper *Cicadulina mbila* acted as the sole transmitting agent and was usually manipulated by the single-leaf cage method [ibid., x, p. 652].

The virus of maize streak was found to be incapable of causing permanent infection of sugar-cane, the Uba plants rapidly recovering from the transitory chlorotic symptoms induced, and ceasing to harbour the virus. Uba cane was readily infected by its own virus, which on transference to maize, however, produced only a mild form of streak quite distinct from ordinary maize streak. Repeated passage of the cane virus through maize failed to enhance its virulence towards the latter host. Hoppers carrying the cane virus were able to take up that of maize also.

With considerable difficulty cane streak was experimentally transmitted to P.O.J. 213 from Uba and from P.O.J. 213 naturally infected in the field. Diseased P.O.J. 213 plants frequently gave quite healthy cuttings. Other cane varieties found to be susceptible to streak were Black Tanna, M.P. 55, CH 64/21, Merthi, Oshira, and Kavangire. On the other hand, Co. 205, 210, 213, and 214, Toledo, Hinde's Special, Kassoer, and Kinar did not become infected. The following wild grasses may be added to the 16 previously known to contract streak in the field: *Dactyloteniuni aegyptiacum*, *Tragus racemosus*, *Setaria verticillata*, *Rottboellia exaltata*, *Cymbopogon citratus*, and *Diplachne eleusine*.

Streak in *Digitaria horizontalis* was transmitted from the same host and to and from maize, but not from cane. The virus from a naturally diseased *Digitaria* plant, however, was more virulent to cane than the maize virus. *E. indica* could not be infected from maize or Uba cane, but it once contracted mild symptoms from P.O.J. 213. The virus from *Eleusine* itself was only able, in the authors' experiments, to cause temporary infection of the same host.

Under experimental conditions infective leafhoppers survived the winter in the open at Durban and infected maize in the following spring, and it is thought that these insects, rather than perennial host plants, constitute the normal source of the virus for spring infections.

A supplementary table shows the negative results of tests in streak transmission by 21 species of Cicadellids and 4 of Fulgorids.

HOPKINS (J. C. F.). **Some common diseases of Potatoes in Southern Rhodesia.**—*Rhodesia Agric. Journ.*, xxviii, 8, pp. 736–742, 2 pl., 1931.

Brief, popular notes are given on the following fungous and virus diseases of potatoes found in Southern Rhodesia: early blight (*Alternaria solani*), black scurf (*Rhizoctonia* [*Corticium*] *solani*), wilt (*Fusarium culmorum* and a bacterium), tuber rot (*F. solani*), sprain or brown fleck, streak, and crinkle. Three applications of Bordeaux mixture 4–4–50 at about three-weekly intervals have given excellent control of early blight on a commercial scale, often increasing the yield by 100 per cent.

GILLETT (S.), MCDONALD (J.), & ANDERSON (T. J.). **A bulletin on the Potato. Varieties and cultural methods. Diseases. Insect pests.**—*Kenya Dept. of Agric. Bull.* 10 of 1931, 15 pp., 1931.

Notes are given (by J. McDonald) on the following potato diseases occurring in Kenya: early blight (*Alternaria solani*), virus diseases (leaf roll, mosaic, crinkle, curly dwarf, and streak), powdery scab (*Spongospora subterranea*), black scurf (*Hypochnus* [*Corticium*] *solani*, the perfect stage of which was observed for the first time in the Colony at Nairobi in December, 1930), and storage diseases (*Fusarium* spp.). Control measures are briefly indicated.

Virus diseases of the Potato and their control.—*Dept. of Agric. for Scotland Leaflet* 60, 11 pp., 4 pl., 1931.

Notes are given in general terms on the occurrence in Scotland of virus diseases of the potato, which are discussed under the headings of leaf roll, mosaic (severe and mild), perpetuation, transmission, symptomless 'carriers', vigour of stocks, varietal resistance, effect on yield, conditions affecting degeneration, control measures, stock seed, and building up healthy stocks [cf. *R.A.M.*, x, p. 542].

Bensaude (Mathilde). **A degenerescência das Batatas.** [Potato degeneration.]—Reprinted from *Actualidades Biol.*, iv, 61 pp., 17 figs., 1931.

This is a discussion in general terms of the current hypotheses relating to potato degeneration, the diseases associated with which are stated to be very common, though largely overlooked, in Portugal. The phenomenon is considered under the following headings: properties of the viruses; cell inclusions; types of degeneration disease (mosaic, leaf roll, stipple-streak, crinkle, and filosité); classification of the viruses and degeneration diseases [cf. *R.A.M.*, x, p. 746]; losses caused by these diseases; resistance and susceptibility to them among standard potato varieties; direct and indirect influence of soil and climate on potato degeneration; and methods of combating the virus diseases.

Blattný (C.). **Lze zjistiti přitomnost viru působícího některé choroby Bramborů v jejich přenášeči, mšicích?** [Can the viruses that cause certain Potato diseases be detected in their aphid vectors?]—Reprinted from *Věstn. Král. Čes. Spol. Nauk* [*Trans. Roy. Bohemian Univ. of Sciences*], *1931*, Prague, 2, 7 pp., 1931. [English summary.]

The author states that his microscopical studies of aphids (chiefly *Myzus persicae*) collected from leaf roll, mosaic, and stipple-streak potato plants failed to reveal any marked cytological or histological differences from disease-free parthenogenetic individuals collected on healthy plants and from similar aphids born and bred on the peach [cf. *R.A.M.*, ix, p. 261]. The only difference noted was that while in uninfective individuals the areola around the cell nucleus of the salivary glands is constantly clear, in the majority of the insects collected from diseased potatoes the areola was dark and indistinguishable from the rest of the cytoplasm.

Rochlin (Emilia J.). К анатомии Картофельного растения, пораженного мозаичными заболеваниями. [On the anatomy of the Potato plant affected with mosaic-like diseases]—*Materials for Mycol. and Phytopath.*, Leningrad, viii, 2, pp. 145–154, 3 pl., 1931.

This is the original Russian paper by the author on the pathological alterations observed by her in the anatomical structure of potato plants affected with virus diseases, the German translation of which has already been noticed [*R.A.M.*, x, p. 264].

LONGRÉE (KARLA). **Untersuchungen über die Ursache des verschiedenen Verhaltens der Kartoffelsorten gegen Schorf.** [Investigations on the cause of the differing reaction of Potato varieties towards scab.]—*Arb. Biol. Reichsanst. für Land- und Forstwirtsch.*, xix, 3, pp. 285–336, 13 figs., 7 graphs, 1931.

The writer discusses and tabulates the results of her investigations at Dahlem, Berlin, on the causes underlying the differing reaction of some standard potato varieties to scab [*Actinomyces scabies*: *R.A.M.*, x, p. 618].

No correlation was found to exist between varietal reaction and the time of periderm formation in the young tubers, the course of development of the epidermal layers, the final thickness of the cork layers of the skin, or the size and shape of the lenticel surface and the arrangement of the lenticels in the cork layer. There was, however, a connexion between the degree of suberization of the lenticel meristem and varietal reaction to scab, this process generally taking place relatively early in resistant, and late in susceptible varieties. A loose arrangement of the cells of the lenticel above the lenticel meristem was observed only in the susceptible varieties, a rather close one in both groups, and a uniformly dense one with rounded cells exclusively in the resistant varieties. It was also found that the varieties in which the lenticel cells become suberized early are generally resistant. The 'healing' process which occurs in the latter varieties towards the close of tuber growth consists in the shedding of old pustules while no new ones are formed. Susceptible varieties, e.g., Allerfrüheste Gelbe, Erstling [Duke of York], and Industrie, were found to be capable of extensive wound periderm formation, whereas in resistant ones, such as Dauerragis, Ackersegen, and Jubel, wound periderm development was only slight.

KÖHLER (E.). **Ueber das Verhalten von Synchytrium endobioticum auf anfälligen und widerstandsfähigen Kartoffelsorten.** [On the behaviour of *Synchytrium endobioticum* on susceptible and resistant Potato varieties.]—*Arb. Biol. Reichsanst. für Land- und Forstwirtsch.*, xix, 3, p. 263–284, 4 pl., 2 figs., 1931.

Pursuing his investigations on the behaviour of the potato wart fungus (*Synchytrium endobioticum*) on susceptible and resistant varieties [*R.A.M.*, x, p. 814], the author differentiates the following infection grades. (I) All or almost all the sori fail to develop. (II) The great majority of sori are abortive, intact ones being found only on the upper infected leaves and portions of the stem. (III) Most of the sori are intact on the upper infected leaves and mid-stem region of the full shoots; conspicuous necroses are restricted to the stem base and lower leaves. (IV) The sori are predominantly intact; extensive necroses are almost entirely confined to the lower leaves. (V) Necroses are barely perceptible, but all or nearly all the sori develop completely.

The mode of infection by the fungus was found to be identical on both resistant and susceptible varieties, the number of successful penetrations also being equal in both cases. The death of the parasite in resistant varieties is a result of necrotic processes

taking place in the host tissue. In very severe infection the whole diseased area dies and forms a dark brown layer over the infected organ. Growing organs gradually shed this layer, of which only traces finally remain. This process, which is termed 'necrogenic abortion', falls into two types, acute and chronic. In the former, occurring only a few hours or days after infection, the invaded host cell itself is the first to decay, whereas in the latter the adjacent cells are first destroyed, leaving the infected host cell to die (with the fungus) at a more advanced stage. A typical wound reaction is generally induced by the necroses.

In addition to necrogenic abortion, the intensity of the hyperplastic reaction of the infected cellular tissues of the host to the presence of the fungus [loc. cit.] plays an important part in resistance or susceptibility.

The varieties belonging to grades (I) to (III) of tolerance are absolutely immune in the field, while those of (III) to (V) are partly immune and partly susceptible.

LEMMERZAHL (J.). **Zur Methodik der Krebsprüfung von Kartoffelstämmen.** [On the technique of testing Potato stocks for wart disease.]—*Der Züchter*, iii, 5, pp. 138–152, 8 figs., 1931.

Continuing his attempts at the further simplification of the soil inoculation process for the testing of potato varieties for reaction to wart disease [*Synchytrium endobioticum*: *R.A.M.*, x, p. 335], the writer found that the inoculum retains its virulence for six days, but to ensure complete reliability it should not be used for more than four, while the time of inoculation should not be less than four hours. The omission of a vaseline ring from around the eyes that were to be inoculated did not prevent successful infection by zoospores, provided the inoculations were performed in a moist chamber, but no saving of labour was thereby effected. A temperature range of 10° to 20° C. was found to be suitable for inoculation. The warts used as inoculum should be two, four, or more weeks old; the use of material three weeks old should be avoided as mature zoospores are not usually present. The inoculum should be derived from varieties showing a high degree of susceptibility and a pronounced reaction [see preceding abstract]. In order to test the possibilities of beginning the inoculations immediately after the harvest, experiments were carried out on freshly collected tubers, with positive results in 80 per cent. of the cases.

DOROGIN (G. N.). Инструкция учреждениям и лицам, работающим с сортовым Картофелем по проведению мер для предупреждения заноса и распространения у нас рака Картофеля. [Instructions to institutions and persons working with Potato varieties in regard to the measures to be taken for the prevention of the introduction and spread in our country of the Potato wart disease.]—*Materials for Mycol. and Phytopath.*, Leningrad, viii, 2, pp. 57–61, 3 figs., 1931.

After giving a very brief description of the morphology and biology of *Synchytrium endobioticum* (which is stated to be so far absent from the Union of Soviet Republics), the author gives

a few recommendations for the careful phytopathological examination of all potato varieties imported from abroad, especially from Germany. It is pointed out that some of the 'resistant' varieties, e.g., Jubel, originating from that country are particularly dangerous, inasmuch as they frequently bear small, inconspicuous lesions which may be easily overlooked, and can only be detected under the microscope or by inoculation tests. In the case of the accidental introduction of the wart disease into any locality, drastic steps should immediately be taken for its complete eradication, including the thorough removal from the soil of all parts of the diseased plants and their destruction by fire, the isolation of the infection foci with a margin not under 2 m. all around, the disinfection of the ground under the infected stools with fungicides, and keeping such spots under clean fallow for ten years at least.

Köck (G.). **Über das Verhalten der verschiedenen Kartoffelsorten gegenüber dem Erreger der Kartoffelknollenfäule (Phytophthora infestans).** [On the reaction of different Potato varieties to the causal organism of Potato tuber rot (*Phytophthora infestans*).]—*Fortschr. der Landw.*, vi, 16, pp. 518–522, 3 figs., 1931.

The writer discusses and tabulates the results of his inoculations in Vienna of cut disks of 80 potato varieties in order to test their reaction to the tuber rot caused by *Phytophthora infestans*. The varieties are placed in five different categories based on the classification of Jones and his collaborators (*U.S. Dept. Agric. Bureau of Plant Indus. Bull.* 245, 1912), viz., (1) highly resistant, (2) moderately resistant, (3) intermediate, (4) fairly susceptible, and (5) very susceptible. Group (1) includes Topas, Marius, and Klondyke; (2) Rubinkipfler, Regent, Gloria Juni, Exquisite, Malta, Rotkaragis, and Edzell's Blue; (3) *Solanum commersonii*, Industrieperle, Beseler, Paulsen's Juli, Wohltmann, and six others; (4) Cellini, Blücher, Evergood, Berlichingen, Graf Dohna, Erdgold, Triumph, and 16 others; (5) Goldball, Silesia, Pirola, Preussen, Hindenburg, Goldappel, Odenwälder Blaue, Kipfler, Ackersegen, Jubel, Parnassia, Deodara, Dauerragis, and 23 others.

An examination on the ninth day after inoculation showed considerable varietal differences in the extent of sporangial formation, but no correlation could be detected between this character and vigorous mycelial growth. In cultures with profuse mycelial development the hyphae were mostly straight and little branched, whereas in cultures of scanty growth they were much twisted, with a strikingly gnarled appearance and numerous short branches. The latter may be characterized as 'inhibition' or 'starvation' forms, their peculiar type of growth being apparently due to some inhibiting factor in the host. No connexion could be traced between hydrogen-ion concentration and the extent of mycelial development.

Tengwall (T. A.). **Topinsterving bij oculatie-uitloopers.** [Top die-back of bud shoots.]—*De Bergcultures*, v, p. 34, pp. 916–917, 3 figs., 1931.

A brief note is given on the *Phytophthora* infection of *Hevea*

rubber buddings in Java, the symptoms of which have already been described [*R.A.M.*, ix, p. 267]. Another form of die-back of bud shoots, in which *Phytophthora* does not seem to be involved, has recently been observed. The disease occurs chiefly on the shoots from buds on heavy stocks with a well-developed root system, but it has also been observed on bud shoots on 1½-year-old stocks. The tips of the shoots may wither before they have put out leaves or after they have begun to branch. Cases of top die-back have been investigated in shoots developing on the upper part of five-year-old bud scions lopped to a height of about 2 m. owing to the breaking off of a branch.

REYDON (G. A.). **Over de meest in Besoeki voorkomende wortelschimmels bij Rubber en Koffie.** [On the root fungi most prevalent in Besoeki on Rubber and Coffee.]—*De Bergcultures*, v, 33, pp. 892–897, 899–900, 902–909, 1931.

Rubber in the Besoeki district of Java is liable to infection by three root fungi, viz., white (*Rigidoporus microporus*) [*Fomes lignosus*], brown (*F. lamaoensis*), and red (*Ganoderma pseudoferreum*) [*R.A.M.*, viii, p. 202; x, p. 405], the last-named, however, being of rare occurrence. Both in East Java and along the east coast of Sumatra, a high proportion of trees attacked by *F. lignosus* (50 to 75 per cent.) recover spontaneously. In *G. pseudoferreum* natural recovery has been observed in some 20 per cent. of infected young trees and in more than half the old ones as a result of improved drainage. On the other hand, *F. lamaoensis* destroys its hosts, namely, rubber, coffee, lamtoro [*Leucaena glauca*], and dadap [*Erythrina lithosperma*], within a few months.

Coffee suffers most severely from the attacks of *F. lamaoensis*, which has been found to spread from the stumps of jungle trees, especially *Artocarpus* sp., left in the plantation after clearing operations. Inoculation experiments by s'Jacob with coffee and *L. glauca* roots bearing *F. lamaoensis* resulted in the rapid infection of rubber. The author's own inoculations on *Hevea* seedlings with the white mycelial strands removed from infected *Hevea* roots gave negative results, the strands dying out after a time. The white and red root fungi may be successfully combated by means of isolation trenches three feet deep, and the opening up of the diseased roots which are then excised and burnt, the wounds being disinfected with 20 per cent. carbolineum or 10 per cent. izal, but in the case of the brown root fungus the prophylactic eradication of the infected tree stumps is necessary. The estimated cost of the former treatment apart from the trenching [full details of which are given, together with notes on other methods still in the experimental stage] is 30 cents to Fl. 4 per tree.

BRONSART (H. v.). **Bodenmüdigkeit, ihre Ursachen und Bekämpfung.** [Soil sickness, its causes and control.]—Reprinted from *Wissensch. und Technik des Gartenbaues*, i, 83 pp., 1 fig., 2 diags., 5 graphs, 1931.

This is a discussion, based on personal observations as well as on a survey of the relevant literature, on the problem of 'soil sickness', with special reference to German conditions. The sub-

ject is considered mainly from the chemical standpoint. The influence of various methods of partial sterilization is discussed at some length.

A bibliography of 102 titles is appended.

Ryakhovsky (N.). Определитель грибных болезней Аниса и Кориандра [Key to the fungal diseases of Anise and Coriander.]—*Plant Protection*, Leningrad, viii, 2, pp. 185–186, 1931.

This list of parasitic fungi attacking aniseed [*Pimpinella anisum*] and coriander [*Coriandrum sativum*] plants in Russia is stated to have been compiled from scattered notes in literature, with the exception of *Cercospora coriandri* Sacz. [? Jacz.] on coriander, which is recorded as a new species; it is characterized by conidia 30 to 75 by 3 to 5 μ in diameter, with one or two faintly discernible septa. The other diseases on coriander are those caused by *Protomyces macrosporus*, forming hard, corn-like swellings, from 9 to 11 by up to 3 mm. in diameter, on the stems, petioles, and leaves, later liberating globular or ellipsoidal chlamydospores, 40 to 80 by 35 to 60 μ, with a thick, yellowish wall and hyaline contents, and the rust due to *Puccinia petroselini*. The diseases of aniseed mentioned are those caused by *Plasmopara nivea* (downy mildew) [*R.A.M.*, x, p. 775], *Cercospora malkoffii* Bub., and the rust *Puccinia pimpinellae*.

Christoff (A.). Бактериозата по културния Макъ. [A bacterial blight of the Opium Poppy.]—*Renseignements Agricoles* [? Sofia], xii, 1–2, pp. 27–46, 2 pl., 1931. [English summary.]

This is a detailed account of a bacterial disease of the opium poppy (*Papaver somniferum*) found in two localities in Bulgaria, doing considerable damage to the crop. The symptoms [which are fully described] are both of a local and systemic nature, and inoculation experiments showed that the causal organism may gain entry into the host tissues both through the stomata and the water pores; in the latter case, the bacteria penetrate the vascular system, where they develop in enormous numbers and spread to all the organs of the plant, including the seeds which are variously discoloured and misshapen. The morphological and cultural characters of the organism, except for a few minor differences, are very similar to those of *Bacterium papavericola* recently described from the United States [*R.A.M.*, ix, p. 456], with which it is provisionally considered to be identical. Its pathogenicity to the opium poppy and to the oriental poppy (*P. orientale*) was proved by successful inoculations.

The chief source of infection appears to be the seed, and it is recommended to use exclusively seed from healthy plants.

Stevens (F. L.) & Atienza (J. D.). **Diseases of cultivated Ginger.**—*Philipp. Agric.*, xx, 3, pp. 171–176, 4 figs., 1931.

Cultivated ginger (*Zingiber officinale*) in the Philippine Islands suffers severe damage from a disease characterized by irregularly oblong, snow-white spots on the leaves, 150 by 225 μ in diameter and surrounded by a water soaked zone 75 to 100 μ wide. As the

spots enlarge numerous pycnidia develop in the centre, which becomes very ragged and torn. In the final stages two-thirds or more of a leaf may be involved by the coalescence of individual spots. The causal organism, to which the name of *Coniothyrium zingiberi* Stevens and Atienza sp. nov. is given, is characterized by circular, subglobose, dark yellow to black, reticulate pycnidia, 40 to 125 μ in diameter, with a clearly defined circular ostiole, 7 μ in diameter, and pale yellow, continuous, ovoid, often biguttulate spores, 3·5 to 4 by 7 to 10 μ. In culture the pycnidia are distinctly rostrate, the rostrum measuring 25 μ in width and 17 μ in height. Inoculation experiments with spore suspensions and mycelial fragments on healthy leaves gave positive results.

A dry, black rot of ginger rhizomes is common, especially on those on or near the ground at the bottom of a pile. The older portions of rotting rhizomes bear on the surface immense numbers of globose, black perithecia, 1,500 to 1,800 μ in diameter, covered with irregular or conical projections about 70 μ high and 120 μ at the base. The interior of the rhizome in these places is rotted away to a mere shell enclosing the vascular framework. In the earlier stages a white, superficial mycelium occurs on the surface of the rhizome, the vascular strands of which are heavily darkened and infected. The causal organism, *Rosellinia zingiberi* Stevens and Atienza sp. nov., is characterized by continuous, multiguttulate, black ascospores, 60 to 70 by 7 μ, with slender awns at each end, 18 μ in length, borne in very thin-walled, hyaline, almost invisible asci, 255 by 30 μ, accompanied by numerous filiform paraphyses. The spores of *R. zingiberi* are much larger than those of *R. gigaspora* though smaller than those of *R. macrosperma*; it differs from *R. emergens* var. *bambusicola* in its larger perithecia and in the shape and thickness of the spores, while the awns constitute a further distinguishing feature.

Red rhizome rot, occurring under similar conditions to those mentioned above, may be readily differentiated by the presence of numerous superficial, bright red, globose, rostrate, ostiolate perithecia, with an irregularly verrucose surface, 210 to 240 μ in diameter. The red mycelium and resulting decay do not penetrate far into the rhizome (3 or 4 mm.). The causal organism, *Nectriella zingiberi* Stevens and Atienza sp. nov., is characterized by very thin-walled asci, 70 by 7 to 10 μ, and hyaline, oblong, unicellular, inordinate ascospores, 10 to 11 by 4 μ. A *Nectriella* on the same host agreeing in perithecial, ascus, and ascospore dimensions with the foregoing but differing from it in the almost complete absence of colour in the perithecia and their occurrence in dense clumps, is considered to constitute a distinct variety and is named var. *pallida*.

VIDAL (L. F.). **El mosaico de la Caña de Azucar.** [Sugar Cane mosaic.]—44 pp., Tipografia Cervantes, San P. de Macoris, Dominican Republic, 1931. [Abs. in *Facts about Sugar*, xxvi, 11, p. 503, 1931.]

Notes are given on the etiology and mode of dissemination of sugar-cane mosaic, methods of control, resistant or immune varieties, and other aspects of the disease. The book is profusely illustrated with photographic reproductions.

McIntosh (A. E. S.). **Report of the Geneticist.**—*Ann. Rept. Dept. of Agric. Barbados for the year 1930–31*, pp. 22–53, 6 diags., 1931.

Symptoms suspected to be those of gumming disease (*Bacterium vascularum*) were first observed in Barbados on the leaves of the Ba. 11569 sugar-cane variety about July, 1929, in the parish of St. Lucy. This diagnosis was later confirmed by Prof. Briton-Jones of the Imperial College of Tropical Agriculture, Trinidad. During the crop season of 1930, no definite cases of gum exudations were recorded in spite of the spread of the 'mild' form of the disease (in which the symptoms are confined to the foliage) over a large part of the island. No diminution of yield appears to be caused by this form of gumming. The results of a test to determine the relative resistance of different varieties to *Bact. vascularum* indicated that Uba, P.O.J. 213, P.O.J. 36, and probably P.O.J. 2364 do not suffer from this disease; B.H. 10 (12), B. 891, B. 417, Co. 213, and B. 391 are highly resistant; while Ba. 11569, Ba. 6032, B. 381, and B. 663 are very susceptible [cf. *R.A.M.*, ix, p. 680 *et passim*].

Abbott (E. P.). **Red rot of Louisiana Sugar Canes.**—*Sugar Bull.*, 1st October, 1931. [Abs. in *Facts about Sugar*, xxvi, 11, p. 502, 1931.]

As determined by artificial laboratory and field inoculations the order of susceptibility to red rot [*Colletotrichum falcatum*] of the chief sugar-cane varieties used in Louisiana is as follows in ascending order: C.P. 807, P.O.J. 213, P.O.J. 36 and 36 M., Co. 281, and P.O.J. 234. Under natural field conditions the first-named variety appears to be highly resistant.

Melhus (I. E.). **The presence of mycelium and oospores of certain downy mildews in the seeds of their hosts.**—*Iowa State Coll. Journ. of Sci.*, v, 4, pp. 185–188, 2 figs., 1931.

Mycelium of *Peronospora alsinearum*, collected in the spring of 1915 on *Cerastium viscosum* in Virginia, was present in the walls of the ovary and seed [cf. *R.A.M.*, ix, p. 426]. Part of the pod and the central placenta contained numerous oospores and mycelium. Some seeds were normal, while others in the same pod contained many oospores, 13 of which were detected in a single section.

In 1912 the Wisconsin pea crop was generally infected by *P. viciae* [ibid., ix, p. 274], the mycelium of which attacks the developing pod, causing enlargement and discoloration of the ovaries, while a few of the seeds fail to mature. No trace of the fungus was detected on the surface of the seed or the inner side of the ovary walls, but on sectioning the seed mycelium was commonly found in the intercellular spaces of the seed coat.

Cystopus bliti was unusually prevalent on *Amaranthus retroflexus* at Ames, Iowa, in the spring and autumn of 1920, causing a reddish or light brown discoloration of the normally green flowers, accompanied by hypertrophy and distortion of the flowers and stems. Mycelium and mature oospores of the fungus were found in the floral bracts, ovary walls, and within the seed coat.

KARPOVA-BENOIS (Mme E. I.). Грибы сем. **Thelephoraceae, собранные в Московской губернии в 1926 году.** [Fungi of the family Thelephoraceae collected in 1926 in the government of Moscow.]—*Materials for Mycol. and Phytopath.*, Leningrad, viii, 2, pp. 77–113, 24 figs., 1931.

In this paper the author gives full macroscopical and microscopical descriptions of 31 species of fungi belonging to ten genera of the Thelephoraceae, which she collected in the government of Moscow in 1926. Several of the species included are well-known parasites of cultivated and forest trees. All the figures illustrating this paper are original.

MANDELSON (L. F.). **Tobacco diseases.**—*Queensland Agric. Journ.*, xxxvi, 2, pp. 213–233, 5 pl., 1931.

Brief popular notes [illustrated by useful large-scale photographs] are given on the symptoms, causal organisms, hosts, conditions predisposing to, and control of the following tobacco diseases known to occur in Queensland, viz., blue mould (*Peronospora* sp.) [*R.A.M.*, x, p. 134], mosaic, black root rot (*Thielavia basicola*), and frog eye (*Cercospora nicotianae*) [ibid., ix, p. 140], as well as on various other tobacco diseases not yet recorded there.

STOREY (H. H.). **A new virus disease of the Tobacco plant.**—*Nature*, cxxviii, 3222, pp. 187–188, 1931.

The writer has recently investigated at Amani, Tanganyika, a tobacco disease characterized by leafy outgrowths from the veins on the lower leaf surfaces, sometimes up to 1 cm. wide, but usually amounting to no more than a dark green thickening of sections of the veins. The whole plant is stunted and the leaves are twisted and curled. No trace of chlorosis or necrosis has been observed.

The disease has been successfully transmitted to healthy tobacco plants by grafting diseased scions on to them, and also by means of an undetermined species of whitefly (Aleurodidae) collected on diseased plants. These experiments under controlled conditions, together with the absence of a visible parasite, would appear to justify the inclusion of the disease in the virus group.

A condition of the tobacco plant in which the leaves are curled has been reported to occur in many parts of South and East Africa, but it is uncertain whether this is due to the same cause as the Amani disease. Two types have been recognized in South Africa, viz., 'curly leaf', an hereditary abnormality, and 'crinkly dwarf', of unknown origin (*Rept. Proc. Pan-African Agric. & Veter. Conf.* Pretoria, 1929, p. 31), the latter agreeing well with the symptoms observed at Amani.

TVERSKOY (D. L.). **Бактериальная пятнистость Табака и Махорки.** [Bacterial spotting of Tobacco and Indian Tobacco.]—*Materials for Mycol. and Phytopath.*, Leningrad, viii, 2, pp. 125–132, 3 figs., 1931.

The author states that his isolations from numerous samples of *Nicotiana tabacum* and *N. rustica* showing bacterial spotting of the leaves from Crimea and North Caucasus yielded practically in every case an organism which, except for some minor differences,

is very similar both morphologically and culturally to *Bacterium tabacum* [*R.A.M.*, x, p. 627]. Inoculation experiments proved the pathogenicity of the bacterium to both species of tobacco, and also to tomato and clover. One experiment in the greenhouse indicated that the formation of concentric rings in the spots is due to the alternation of periods of low atmospheric moisture and high temperature, which completely arrest the development of the bacteria, with periods of high moisture and low temperature which further it.

GHIMPU (V.). **Alternarioza Tutunurilor şi combaterea ei.** [Alternariosis of Tobacco and its control.]—Reprinted from *Bul. Cultivarei şi Fermentarei Tutunului*, Bucarest, xx, 1, 28 pp., 2 pl., 7 figs., 1931. [French summary.]

This is a detailed account of the author's investigation of a very severe leaf spotting of tobacco which did considerable damage to the crop in July and August, 1930, over practically the whole of the tobacco-growing regions of Rumania. The spots were caused by the conidial stage (*Alternaria tenuis*) [*R.A.M.*, vii, p. 765] of *Pleospora alternariae*, the perithecia of which were found on dead tobacco leaves; these are somewhat sunken in the host tissues, dark, hard, globular, with an ostiole surrounded by a few characteristic bristles. Each perithecium contains two or three almost ovoid, hyaline asci, measuring on the average 74 by 34 μ, and including eight hyaline, oval, pluriseptate (5 transverse and one to several longitudinal walls) spores, 30 by 13 μ in diameter.

In giving a full description of the development of the disease in the field, the author states that this serious outbreak was undoubtedly caused by the abnormal heat of the summer months of 1930, broken by heavy rain storms, a combination of conditions which weakened the tobacco plants and was very favourable for the development of the fungus. This view is supported by the fact that *A. tenuis* is extremely widespread both in the air and the soil, and that every year it may be found on tobacco seedlings and young transplants in the spring, without doing, however, any appreciable damage to the crop. This leads him to question whether the fungus was really the primary cause of the disease, although he was able to reproduce it in a mild form in laboratory inoculation experiments.

Since the seed from diseased plants was shown to carry large numbers of spores of *A. tenuis*, and in view of the seriousness of the losses caused by the disease in 1930, it is recommended that the seed should be disinfected before sowing. Most of the usual fungicides which were tested proved to be either ineffective against the fungus or toxic to the seed, but relatively good results were obtained by steeping the seed for 15 minutes in a 1 per cent. silver nitrate solution, or mixing it with potassium bichromate (1 gm. to 1 kg. seed) or ceresan (10 gm. to 1 kg.). The importance is also stressed of thoroughly disinfecting the seed-beds, and of taking the usual sanitary precautions in the tobacco fields, such as immediate removal and burning of all diseased leaves and plant débris, and spraying the plants with fungicidal mixtures. Although all the varieties of tobacco commonly cultivated in Rumania were

equally attacked, two late maturing Italian varieties suffered relatively little from the epidemic, and this fact may be made use of in the development of resistant varieties.

SAMUEL (G.) & BALD (J. G.). **Thrips tabaci as a vector of plant virus disease.**—*Nature*, cxxviii, 3229, p. 494, 1931.

The authors now confirm the earlier work of Pittman and also that of K. M. Smith in finding that *Thrips tabaci* is capable of transmitting spotted wilt of tomato [*R.A.M.*, x, pp. 65, 694], but state that *Frankliniella insularis* appears to be a more efficient vector. They have further found that the latter can only transmit in the larval stage, as is also the case with the transmission of pineapple yellow spot by *T. tabaci* in Hawaii, according to verbal information received from Linford [ibid., x, p. 474].

RAMSEY (G. B.) & BAILEY (ALICE A.). **Tomato late-blight rot, a serious transit and market disease.**—*U.S. Dept. of Agric. Circ.* 169, 10 pp., 6 figs., 1931.

After giving a brief account of the disease of tomatoes caused by a fungus believed to be identical with, or very closely related to, *Phytophthora infestans* in the United States [*R.A.M.*, viii, pp. 24, 140], the authors discuss at some length its economic importance in years of abundant atmospheric moisture (fogs or rains) with cool nights and moderately warm days. Besides the losses in the field, the disease is responsible for serious wastage during transit and marketing. Tomato fruits are susceptible to decay by the fungus during all stages of their development, the rot starting in practically all instances at the stem scar, and about five days being usually required for the decay to become visible. Infections through wounds elsewhere on the fruit produce visible decay much sooner. Tomatoes harvested from diseased fields but showing no decay at the time of shipment may develop spots varying from 1 to $1\frac{1}{2}$ inches in diameter during a six-day transit period. Spread in transit from diseased to healthy fruits is rare. A measure of control of the transit rot may be attained by immersing the tomatoes immediately after harvesting in a 1 in 300 solution of formaldehyde for two minutes, and then allowing them to stand for four or five days before packing, but this treatment requires an expensive equipment, which renders it impracticable for most tomato-growing regions. In the field the disease is best amenable to control by the use of 4–4–50 Bordeaux mixture or by cupric dusts.

VANIN (S. I.). Курс лесной Фитопатологии. Часть I. Болезни и повреждения вызываемые грибами. [Lectures on forest pathology. Part I. Diseases and injuries caused by fungi.]—326 pp., 159 figs., Госуд. С.-хозяйств. Издат. [State Agric. Publications Office], Moscow and Leningrad, 1931.

This useful and copiously illustrated publication is primarily designed to be a text-book for Russian students of forest pathology. It deals with the fungal diseases of trees and the timber decays caused by fungi which are of economic importance and are known

to occur on the territory of the Union of Russian Republics. Control measures, where applicable, are discussed under each disease. A list of the diseases arranged by their hosts and a list of alternate hosts for the rusts dangerous to trees are given at the end of the volume, and the bibliography appended occupies 18 pages.

HAMOND (J. B.). **Some diseases of Walnuts.**—*Ann. Rept. East Malling Res. Stat. 1928, 1929 and 1930, II Supplement*, pp. 143–149, 1931.

The first leaves of walnut trees attacked in the spring by bacterial blight (*Pseudomonas* [*Bacterium*] *juglandis*) [*R.A.M.*, ix, p. 567 ; x, p. 495] at East Malling do not show typical spotting, but are contorted and with spots at the margins only. Infection was successfully caused from such leaves by placing a healthy seedling walnut under them in a cool greenhouse and spraying them with water. Infection was most pronounced on leaflets directly under the contorted ones and it is concluded that under natural conditions the bacteria are washed from leaf to leaf by rain. The source of initial infection each spring is thought to lie in the diseased shoots. In February, 1929, all the old lesions were cut out while the (nursery) trees were still dormant, but this did not prevent subsequent leaf infection. In several instances all the leaves from a single bud were attacked as they unfolded, while leaves from other buds on the same tree were clean at this stage. This suggests that *Bact. juglandis* may overwinter in the bud scales as well as in old stem lesions. It was isolated from stem lesions throughout the period from January to March. Inoculation tests demonstrated that *Bact. juglandis* readily infects young shoots through wounds such as are caused in nurseries by the string used for tying the plants to supports.

In the autumn of 1929, walnut leaves thickly covered with the conidia of *Marssonia* [*Marssonina*] *juglandis* [ibid., viii, pp. 322, 614] were placed in an exposed box, and in the following March abundant perithecia of *Gnomonia leptostyla* were present. The ascospores reinfect the young leaves in spring, giving rise to the conidial stage, *M. juglandis*.

In 1930 several walnut trees were seen on which one or more shoots had died back, the trouble affecting old-established trees, seedling trees planted out, and young grafted trees. Some of the last-named had died back almost to the junction between stock and scion. The dead shoots showed the presence of *Cytospora juglandina* and the *Phomopsis* stage of *Diaporthe perniciosa*.

In the spring of 1930 many walnut trees grafted under glass failed to form a union between the stock and the scion, and the cut surfaces in some cases bore dark brown, powdery, circular or irregularly shaped, very thick-walled fungal spores about 15 μ in diameter. The cells in the dead areas, particularly of the medullary rays, were packed with thick-walled hyphae, while fine hyphal threads also ran through the living cells. In pure culture the dark, spore-like bodies were found to be formed directly from hyphal cells and they are considered to be chlamydospores. Small,

hyaline, rod-shaped, endogenously-formed conidia also developed in these cultures. When the fungus was inoculated into young seedling and grafted walnut trees, the characteristic dark spores were produced. The fungus was determined as belonging to the genus *Chalaropsis*, and Peyronel, who examined a culture, considered it to be identical with *C. thielavioides*, parasitic on lupins in Italy [ibid., vii, p. 582].

A list of fungi found on the shells of stored walnuts at East Malling, including *Botrytis cinerea*, *Rhizopus nigricans*, *Pestalozzia hartigii*, and *Stysanus stemonites*, is given, while those on the kernels comprised species of *Penicillium* and *Mucor* as well as *B. cinerea*, and *R. nigricans*.

Black stem rust quarantine. Quarantine No. 38. Revision of Quarantine and issuance of regulations.—*U.S. Dept. of Agric. Plant Quarantine and Control Admin. Leaflet*, 4 pp., 1931.

This revision of Quarantine No. 38, effective from 1st August, 1931, places under quarantine every State of the Continental United States with respect to the inter-State shipment of species of *Berberis* or *Mahonia* in order to prevent the further dissemination of black stem rust (*Puccinia graminis*). No plants of these species shall be moved from any of the quarantined States into any of the protected States, namely, Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming, nor from one of the said protected States into any other protected State.

The Fruit Tree Pests (Wisbech District) Order of 1931.—2 pp., 1931.

This Order, effective as from 6th July, 1931, provides for the treatment in the Wisbech district of Cambridgeshire of fruit trees invaded by canker [*Nectria galligena*], brown rots [*Sclerotinia cinerea* and *S. fructigena*], or apple and pear scab [*Venturia inaequalis* and *V. pirina*] on the same lines as those indicated in the Fruit Tree Pests (West Norfolk) Order of 1930 [*R.A.M.*, x, p. 560].

The Panama Disease of Bananas Amendment Order, 1931. Under Section 3 of the Protection from Disease (Plants) Law 1925, Law 10 of 1925.—*Dept. of Sci. and Agric. Jamaica*, 2 pp., 1931.

The chief modifications in the Panama Disease of Bananas Amendment Order, 1931 (published in the Jamaica Gazette, 4th June, 1931), are the oil treatment [*R.A.M.*, x, p. 533] described in Section 3 (1) B, and Section 9 enabling a reduced treatment to be prescribed [cf. also ibid., vi, p. 128; vii, p. 492; x, p. 43].